11-15-68

ERIC REPORT RESUME

ERIC ACC. NO.				
ED 025 682				
CH ACC. NO.	P.A.	PUBL. DATE	ISSUE	
AA 000 335	56	Jul 68	RIEJUN69	

IS DOCUMENT COPYRIGHTED? YES ☐ NO ☐
ERIC REPRODUCTION RELEASE? YES ☐ NO ☐
LEVEL OF AVAILABILITY I ☐ II ☐ III ☐

AUTHOR
Ofiesh, Gabriel D.

TITLE
Dial Access Information Retrieval Systems: Guidelines Handbook for Educators. Final Report.

SOURCE CODE	INSTITUTION (SOURCE)
FGK12525	Catholic Univ. of America, Washington, D.C.
SP. AG. CODE	SPONSORING AGENCY
RMQ66004	Office of Education, Washington, D.C. Bureau of Research.

EDRS PRICE	CONTRACT NO.	GRANT NO.
0.75;8.95	OEC-1-7-071042-5093	

REPORT NO.	BUREAU NO.
	BR-7-1042

AVAILABILITY

JOURNAL CITATION

DESCRIPTIVE NOTE
177p.

DESCRIPTORS
*Dial Access Information Systems; *Instructional Technology; Guidelines; *Information Networks; Information Centers; *Data Collection; Cost Effectiveness

IDENTIFIERS

ABSTRACT
Guidelines for the planning, purchase, and utilization of dial access information systems for educational instruction were researched and studied, and incorporated into a handbook for educators. Among the questions asked by the investigating committee were: (1) what are the costs involved in such a system for educational purposes? (2) what is the number and locations of the facilities in operation and those planning operation? (3) what are the attitudes of students and faculty towards acceptance and use of the system? 300 questionnaires were sent to institutions and 10 schools and colleges were chosen for onsite interviews. It was concluded by the committee that at the present time maximum advantage cannot be taken of the dial access technology or the instructional materials and programs available to it. The rapid developments in electronic technology for the retrieval and transfer of stored audio, visual, and printed information and the possible instructional patterns for utilizing this technology, do not present the kind of stability that an institution can confidently expect for finding and adopting tried and true instrumentation and technology. However, the new technology is directing its goals to providing students with a superior education by exploring and using the latest learning techniques and concepts. (PM)

ED025682

FINAL REPORT

Project No. BR 7-1042

Contract No. OEC-1-7-071042-5093

DIAL ACCESS INFORMATION RETRIEVAL SYSTEMS:
GUIDELINES HANDBOOK FOR EDUCATORS

Gabriel D. Ofiesh, Ed.D.
Principal Investigator
Professor of Education and Director,
Center for Educational Technology
The Catholic University of America
Washington, D.C.

July 1968

The research reported herein was performed pursuant to a Contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

PREFACE vii

INTRODUCTION 1

I STATE OF THE ART

A. Description 3

System Concept 3
Basic System Components 3

B. Rationale 18

C. Historical Background 23

D. State of the Art Profile 25

E. Future 28

II GUIDELINES

A. For Administrators 32

Making the Decision 32
Pre-Installation Planning 34
Shopping for Hardware 34
Equipment Costs 37
Developing the Software 38
Faculty Involvement in Using the System 40
Post-Installation Concerns 42
Copyright Status 47
Summary 47

B. For Teachers 51

Faculty Involvement 51
Pre-Installation Planning for Effective Utilization 52
Sources of Materials 53
Methods of Approach 55

C. For Librarians 59

General 60
Conclusions 64

D. For Technical Personnel 65

Specifying Equipment and System Requirements 65
Questions Leading to System Specifications 67
Monitoring, Testing and Record Keeping 73

III APPENDICES

A. Operational Systems in the United States 76

B. Questionnaire Data and Analysis 92

C. Software Sources 101

D. Equipment: Sources and Specifications 110

E. Glossary 120

F. Bibliography 145

CHARTS

Components in Program Distribution 5

Dial Access System 20

Questionnaire Response on Operational Systems 25

The Future: Community Service 31

Steps to be Taken in Proceeding from the Commitment to Install a Remote Access System Through the Operation of the System 43

GRAPHS

Number of Institutions on Different Academic Levels Reporting Operational Dial Access Systems 92

Number of Audio Receiving Stations Reported by Institutions with Dial Access Systems 93

Initial Costs Reported by 94 Institutions for a Dial Access System in Thousands of Dollars 95

Faculty and Student Attitudes Toward Selected Media Based on Semantic Differential Scale Test Administered at 10 Institutions 100

PICTURES

Modern Carrel Design with Touch Tone 6

Access and Control Devices - From the Simple to the Sophisticated 7

Electronic Lectern 8

Program Tapes in Action 9

A Student and Her Carrel 10

Program Room at a Large Installation 11

Timing Devices 12

Carrels at Ohio State University's Listening Center 13

Audio Tape Decks at Oral Roberts University 14

Television Production Master Control Room 15

Student in Carrel with Audio-Video Reception 16

Carrel Groups in Library at Oral Roberts University 17

ACKNOWLEDGMENTS

The handbook was prepared under the direction of Dr. Gabriel D. Ofiesh, director of the Center for Educational Technology at the Catholic University of America with contributions from the following members of his staff: J. Aubrey Bouck, Catherine Caldwell, Elizabeth Copenhaver, Beatrice J. Farr, Mary A. Durland, John P. Luther, Alyce K. Paullin, Everett C. Rompf, and Helen K. Young.

Grateful acknowledgment for their kind advice is given to Dr. Anna Hyer, Dr. C. Raymond Carpenter, and Dr. Wesley Meierhenry, as well as to the assistance of Dr. Frank Kovacs, Dr. Edward Green, Dr. Priscilla Ransohoff, Dr. Donald Stewart, Dr. Geary Rummler, Dr. Edward Maltzman, Mr. Raymond Hartjen.

The cooperation of the administrators, faculty, and students of the eleven schools and colleges visited, greatly enhanced the authority of the staff in the writing of this handbook. A special word of appreciation for the courtesies shown our staff interviewers and the time they gave goes to the deans, presidents and superintendents of the schools and colleges and to all those who otherwise cooperated in our effort.

PREFACE

With any new technology, the claims of enthusiastic advocates and supporters must be weighed carefully. As U. S. Commissioner of Education, Harold Howe, II, so succinctly expressed it: "The real question is not what is new, but rather, how can the new best be used...New media...have frequently been prematurely introduced before either adequate content or reliable evaluation has been available. The result has been all too often a wave of hasty enthusiasm for the promises of a new technology or device, followed by a more leisurely repentance when it fails to live up to its billing."[1] There is no doubt that strong enthusiasm for the rationale of a new system can obscure the day-in and day-out kind of educational effort required to raise the young technology from a novelty to a valuable and integral part of the curriculum.

The studies for this handbook affirm the rapid emergence of dial access information retrieval systems in the past few years. Many educators are intrigued by the system's potential for improving learning or bridging certain educational gaps, recognizing that its uses range from the simple to the sophisticated. The availability, flexibility, and convenience of presenting instructional audio-visual materials in individual carrels or the classroom, offered by the system, enables teachers to assume a more effective role in the school, with expanded audiovisual resources at their fingertips. In linking up teachers and students with the multiplicity of audio-visual equipment and instructional resources, dial access retrieval offers the potential for an improved learning situation.

Changes in educational practice which do not afford incentives to personnel involved or which ignore the powerful force of attachment to the status quo, are futile and unrealistic. Some measure of compensation (financial or intrinsic) for the extra time required, the physical and mental effort involved, as well as the insecurity inherent in a new undertaking, must be provided. Training and support for the change must be planned.

---

[1] Howe, Harold II. "Realities of The Learning Market," speech given before The American Management Association. August 9, 1966.

In utilizing new media for education, the first requirement is to determine its pertinence to the educational goals set; the second is the determination by the instructional staff as well as the administration to use the media to achieve these goals. Our study of users' experience has shown there are definite pitfalls to avoid, and decisions and procedures to be taken for productive use of a dial access system.

With the support of the Office of Education, our purpose has been to provide the kind of guidelines and sources of information that will enable the educator to make sound decisions on whether this new technology serves his particular needs and educational objectives. It is our hope to reduce the element of risk for today's pioneer in the planning and implementing of new educational facilities, so that the potentials of this promising system will be fully realized.

* * *

Every effort has been made to gather complete information about the dial access educational systems that we could discover in the United States only, prior to publication. No claim is made that all such dial access systems in operation are included, nor that a listing, reference, or specification meant an endorsement by the Center for Educational Technology or the U.S. Office of Education, nor that any omission implied disapproval. We are hopeful that any errors or omissions found will have minimal negative effect on the findings and recommendations of this study as a whole.

* * *

INTRODUCTION

In recent years considerable interest and experimentation has been focused on communication-linked educational techniques and systems. Prime examples are: educational television, computer-assisted instruction, telephone lectures, and language laboratories. One of the latest additions to this field of instructional technology is the dial or remote access information retrieval system. Its potential for advancing the quality of education has captured the imagination of many educators, which is evidenced in the rapid growth of installations at all academic levels in the United States.

A typical dial access system is more flexible than a conventional language laboratory but considerably less sophisticated than a computer-assisted instruction system. Its principle function at present is to make available by means of electronic transmission a variety of stored audio and visual educational materials for independent study or for classroom instruction. However, the system has many other capabilities ranging from reception of community radio and television stations to link-up with a computer for problem-solving.

It is difficult for any educational institution to develop intelligent guidelines for the planning, installation, operation, and financing of a dial access information retrieval system in the absence of some generally accepted criteria for educational effectiveness, for appropriate system design, for equipment selection, operational procedures and cost. Furthermore, the experience with, and investment in dial access information retrieval systems and their concomitant communication networks may well influence the ultimate role of the computer in the educational system -- particularly its role in instruction, diagnosis and information storage and retrieval.

For these reasons a study was made of existing dial access systems in order to establish sound and practical guidelines for determining effective systems to meet more fully educational needs and objectives. To conserve the reader's time, sections have been written for particular fields of interest. Because of this approach, those who choose to read the handbook from cover-to-cover will find certain thoughts and recommendations repeated. The study includes literature, questionnaires, and visits to educational institutions utilizing such systems.

In order to insure the continued usefulness of this study, the Center for Educational Technology at Catholic University has set up an educational resources laboratory for gathering and making available data on the progressive uses of dial or remote access systems. Accordingly, the Center welcomes the reader's comments on the handbook, as well as opinions and evaluations of experiences with this technology, so that through such cooperative efforts we may contribute to the healthy development of a science of education.

I. STATE OF THE ART

A. DESCRIPTION

System Concept

Dial access information retrieval is an electronic system for distributing audio and video materials and programs which are stored in a location remote from where they are dialed and received. Such materials, generally recorded on tape or film, are accessed by a student in a study carrel or by a teacher in a classroom simply by dialing an assigned three digit number for the program desired. The information is programmed and supplied by the teacher.

Since there is no limitation as to where the information can be sent, receiving stations can be located in one building or in many. At Oklahoma Christian College they are concentrated on two floors of the Learning Resource Center (all 850 of them). At Ohio State University, the 400 odd stations are located in a dozen buildings on and off campus --- in the listening center, library, student union, classrooms, dormitories, etc. When the system is to be employed by an institution which covers a large physical area, convenience in the location of the carrels becomes an important factor in their use.

Basic System Components

The student position is the study booth, or carrel, in which the student dials selected programs for listening and viewing. Individual carrels come in many designs and are arranged in various configurations. Although there are many variations in equipment, they all have a dial, push-button, or other selection device, a volume control, and head phones. Where video is added, a small television monitor or receiver (8" or 9") is included to display video materials emanating from tape, film, and slides, or to pick up live closed-circuit presentations and community television stations. The majority of remote access systems provide for listen-only facilities, which can be supplemented by bringing portable slide and film projectors to the carrel. Some systems are audio-active enabling the student to speak into a microphone and hear himself simultaneously through earphones. Another capability is audio-active record by which the system records the students' responses for playback. Some carrels provide plug-in jacks in the carrel so that students may tape programs on their portable recorders for individual use. The most sophisticated audio system provides student controls over the recorded material to stop, start, forward, reverse, record, and playback. The program and control room contains the equipment which receives the student's request for a program, which it connects to the proper line, and disconnects when the student finishes listening. The programs can be accessed by each position at any time regardless of the number of requests being processed. Except for the most sophisticated systems, those students who dial for a particular program after the first user must join it in-progress. The efficiency of a large system is increased by the inclusion of a computer to act as a switchboard and dispatcher. This addition, in a large system, reduces the time for a dialed request to be filled and saves space by cutting down the number of switching components necessary for efficient operation.

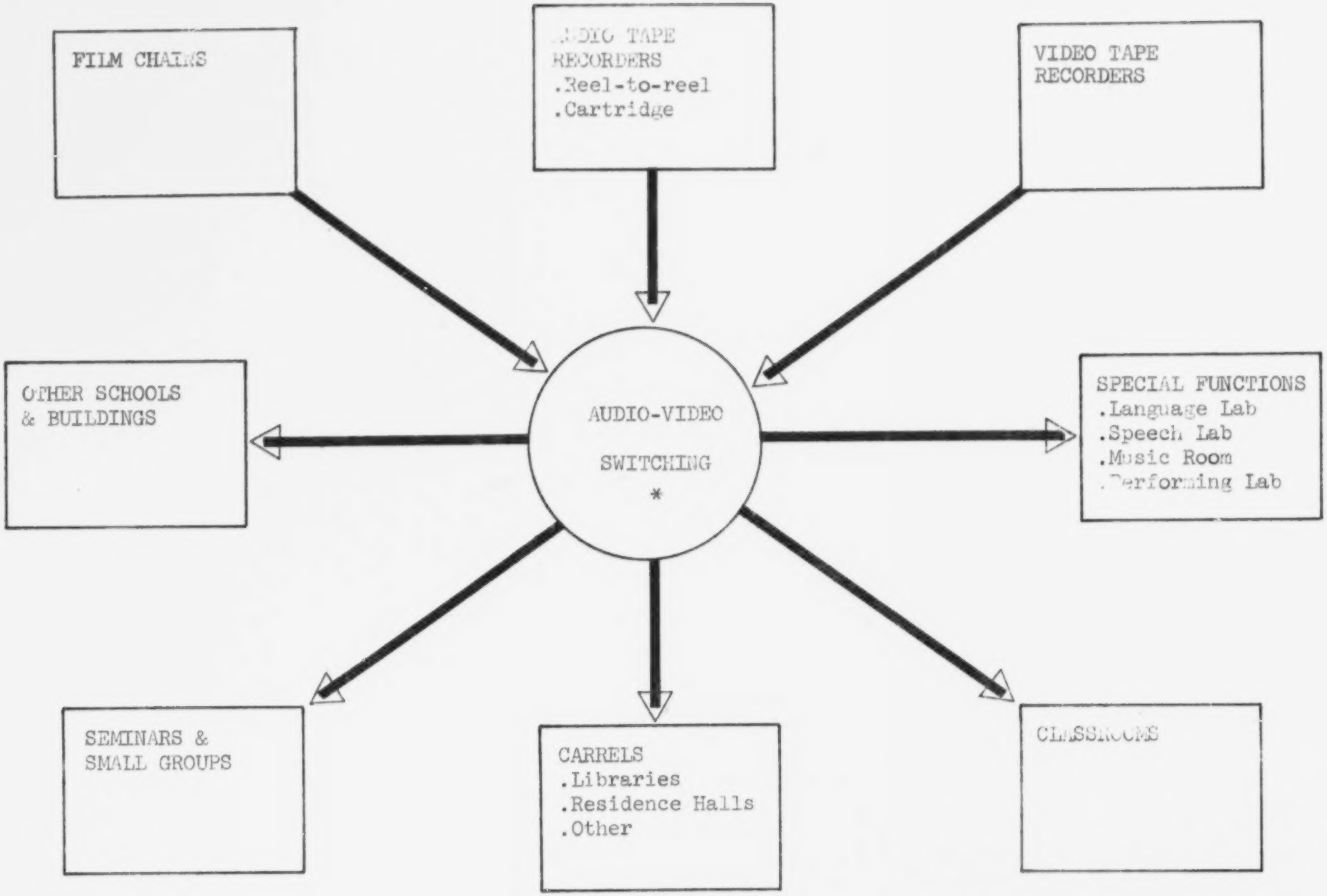
Tape decks and switching mechanisms necessary for automatic and scheduled transmission are to be found in the control room (tape decks may be reel-to-reel or cartridge type). Where the system has video capability, it is also the location of video tape recorders, film and slide projectors, and other associated equipment. The programs on the machines can be activated in three ways:

1) by student or teacher dialing and automatically starting the selected program which at the completion rewinds to the start position;

2) by time-scheduling wherein an attendant presets the times at which selected programs are to be played;

3) and by a person manually placing tapes on the system following a telephoned or written request.

COMPONENTS IN PROGRAM DISTRIBUTION

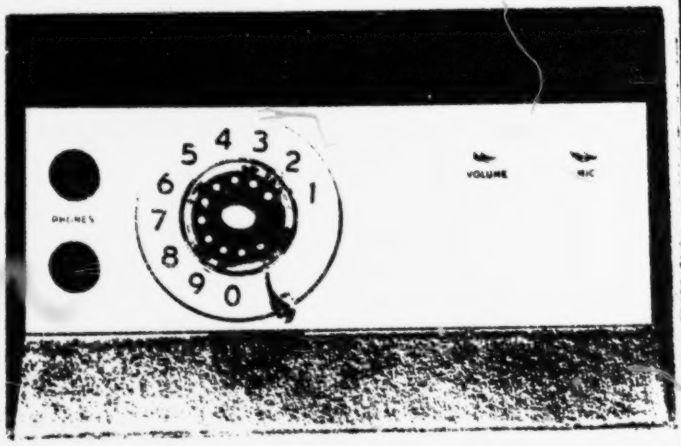

FILM CHAINS
AUDIO TAPE RECORDERS
.Reel-to-reel
.Cartridge
VIDEO TAPE RECORDERS
OTHER SCHOOLS & BUILDINGS
AUDIO-VIDEO SWITCHING
*
SPECIAL FUNCTIONS
.Language Lab
.Speech Lab
.Music Room
.Performing Lab
SEMINARS & SMALL GROUPS
CARRELS
.Libraries
.Residence Halls
.Other
CLASSROOMS

* Computer-processor added to large systems for efficiency & economy

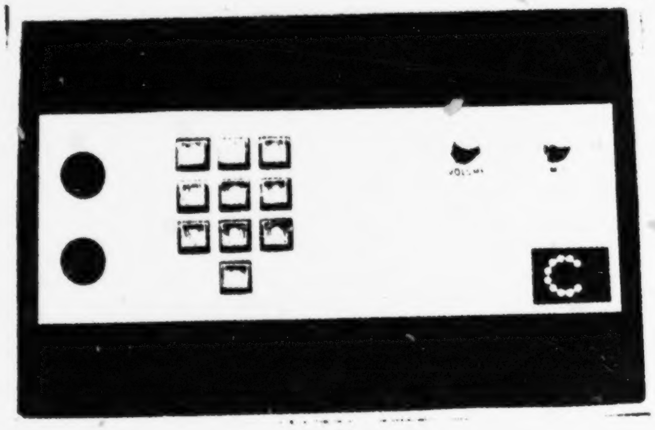
MODERN CARREL DESIGN WITH TOUCH TONE

Use of workbook or other means for student response is effective in maintaining attention and motivation while listening.

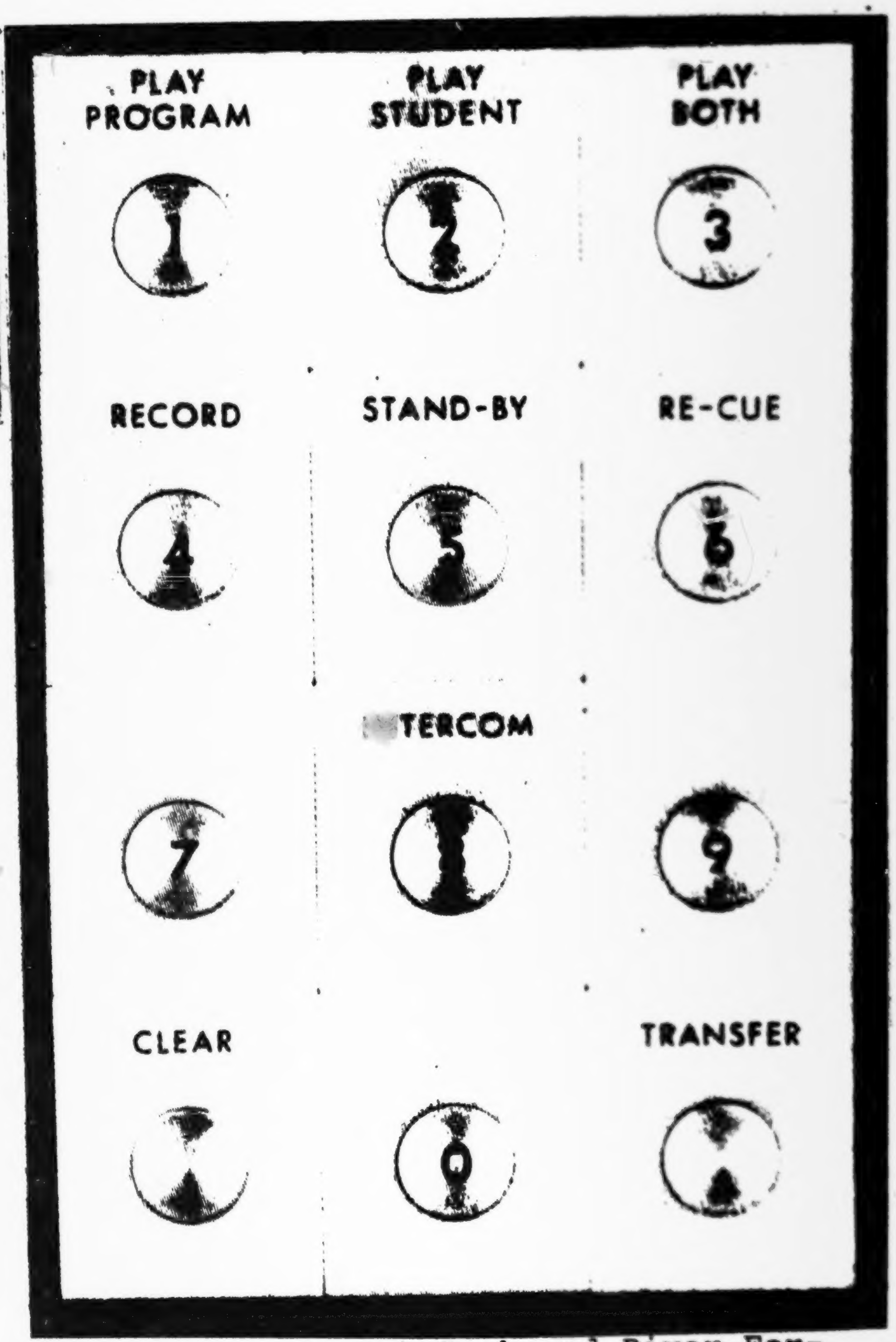
ACCESS AND CONTROL DEVICES - FROM THE SIMPLE TO THE SOPHISTICATED


5 4 3 2 1
6 7 8 9 0
PHONES
VOLUME
MIC

Most Popular

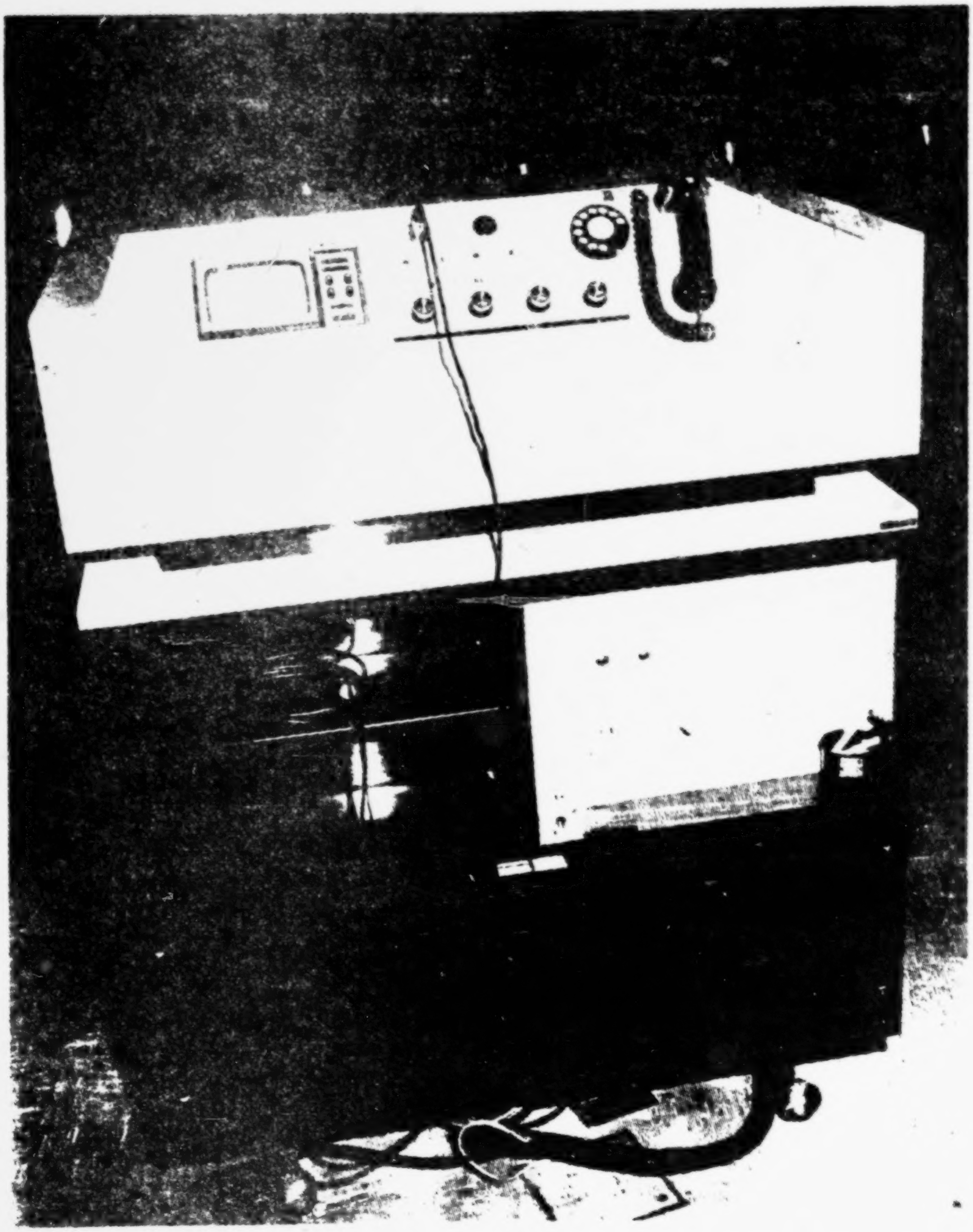


Also Available


PLAY PROGRAM
PLAY STUDENT
PLAY BOTH
1
2
3
RECORD
STAND-BY
RE-CUE
4
5
6
INTERCOM
7
8
9
CLEAR
TRANSFER
0

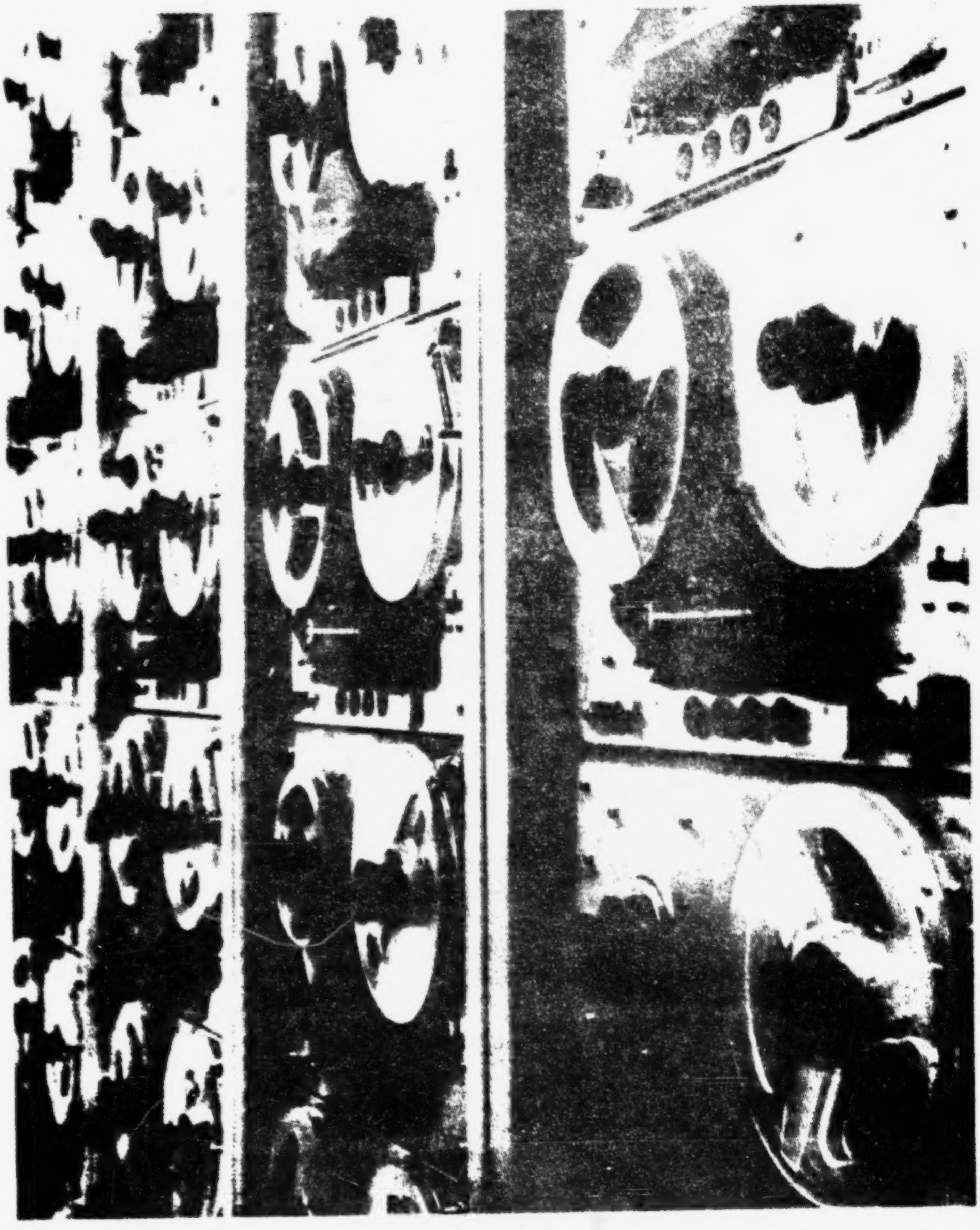
Controls at Oak Park and River Forest High School, Illinois permit students to record and manipulate program tape at will.

ELECTRONIC LECTERN



Lecterns with Electronic Access and Controls are becoming popular with instructors for multi-media presentations.

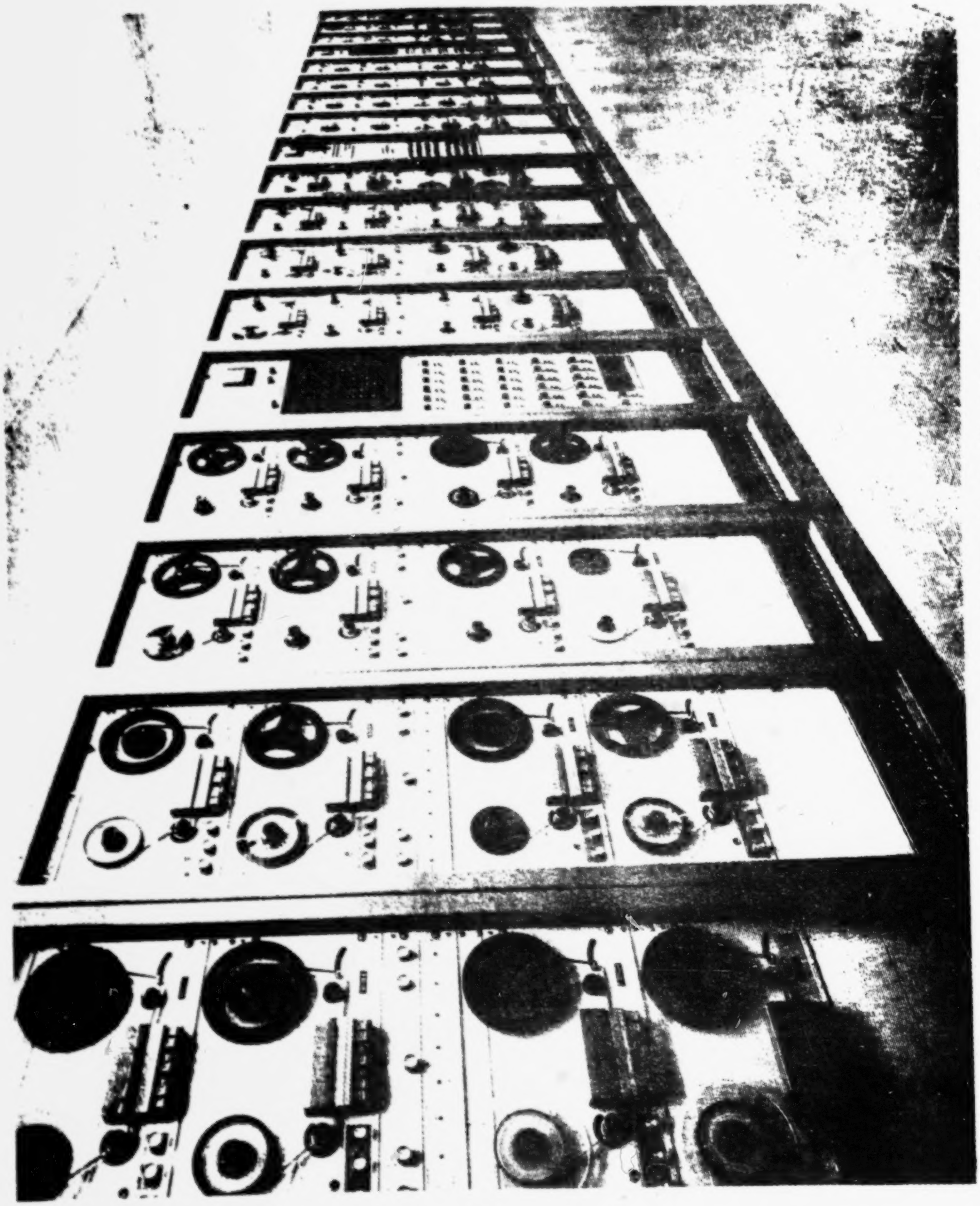
PROGRAM TAPES IN ACTION



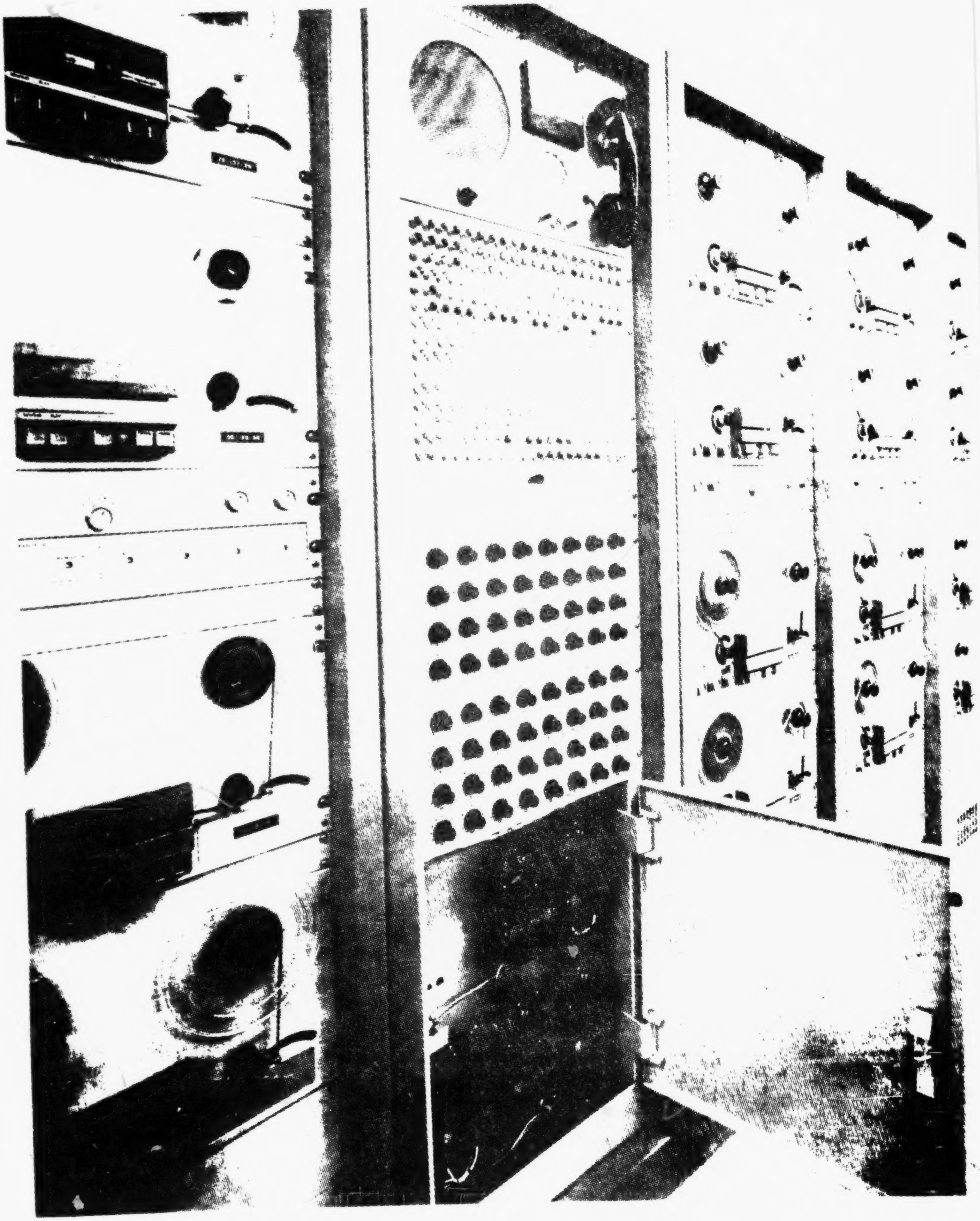
40,000 dialed calls a week at Ohio State University facility keeps program tapes whirling.

A STUDENT AND HER CARREL

At Oklahoma Christian College, each student has a permanent carrel assigned - a personal place to study.



Panoramic view of program room at a large installation. Each of these tape playbacks provides one Audio Channel (program source) with the capability of being used for four channels when desired.

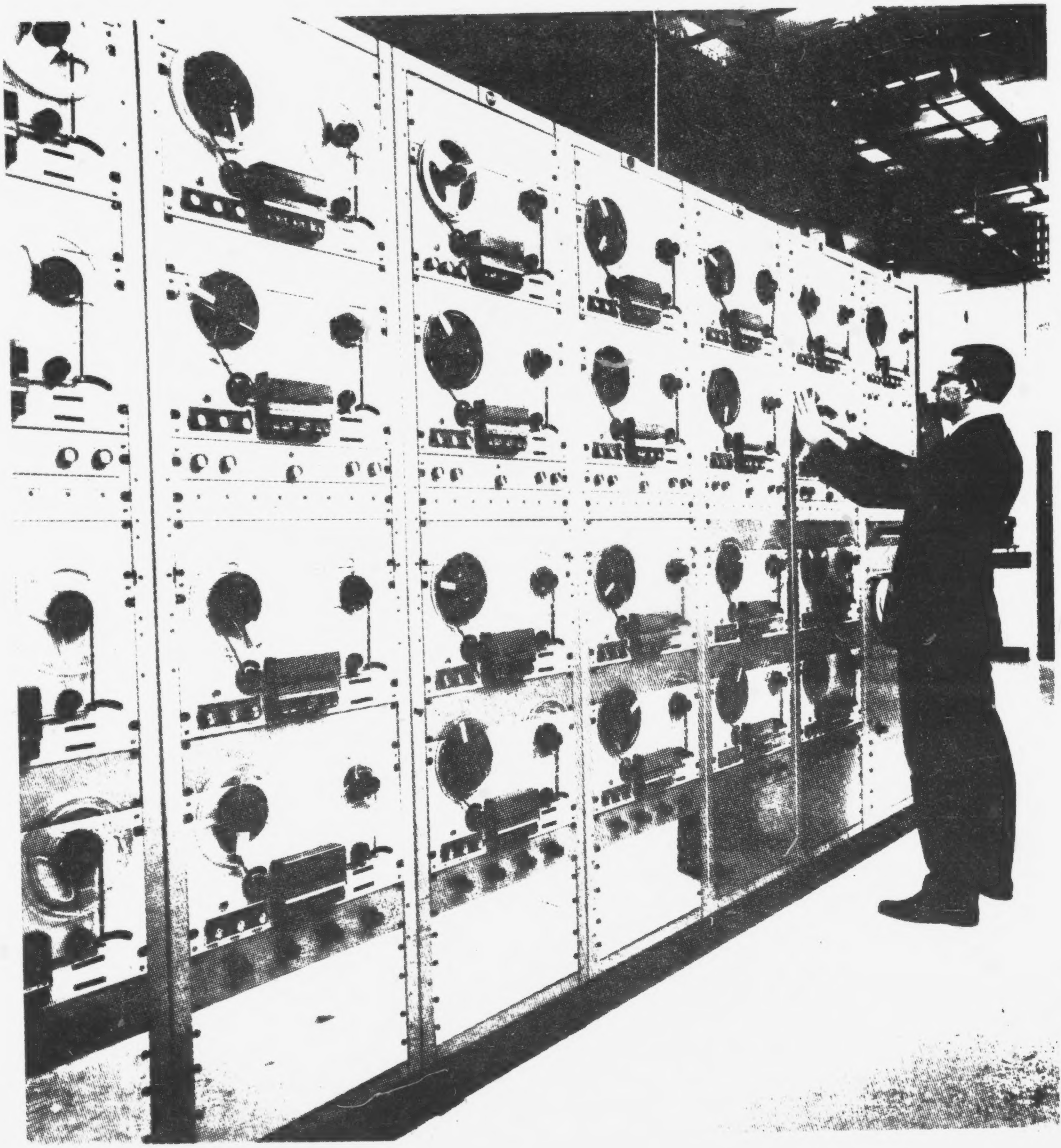


Timing devices can schedule programs to start automatically at hours desired.

CARRELS AT OHIO STATE UNIVERSITY'S LISTENING CENTER

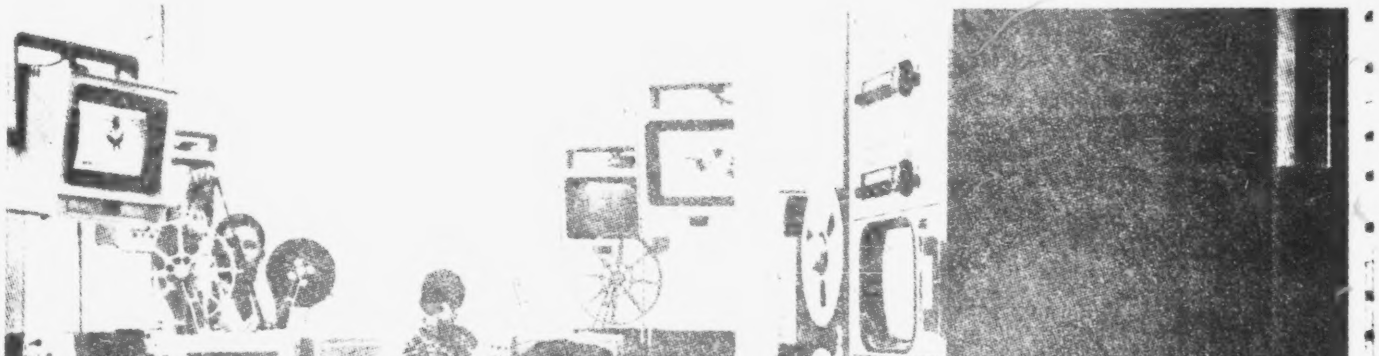
This is only one of many places on the campus where students can dial in for audio programs. Convenient location of carrels has been an important factor in widespread use of dial system at Ohio State University.

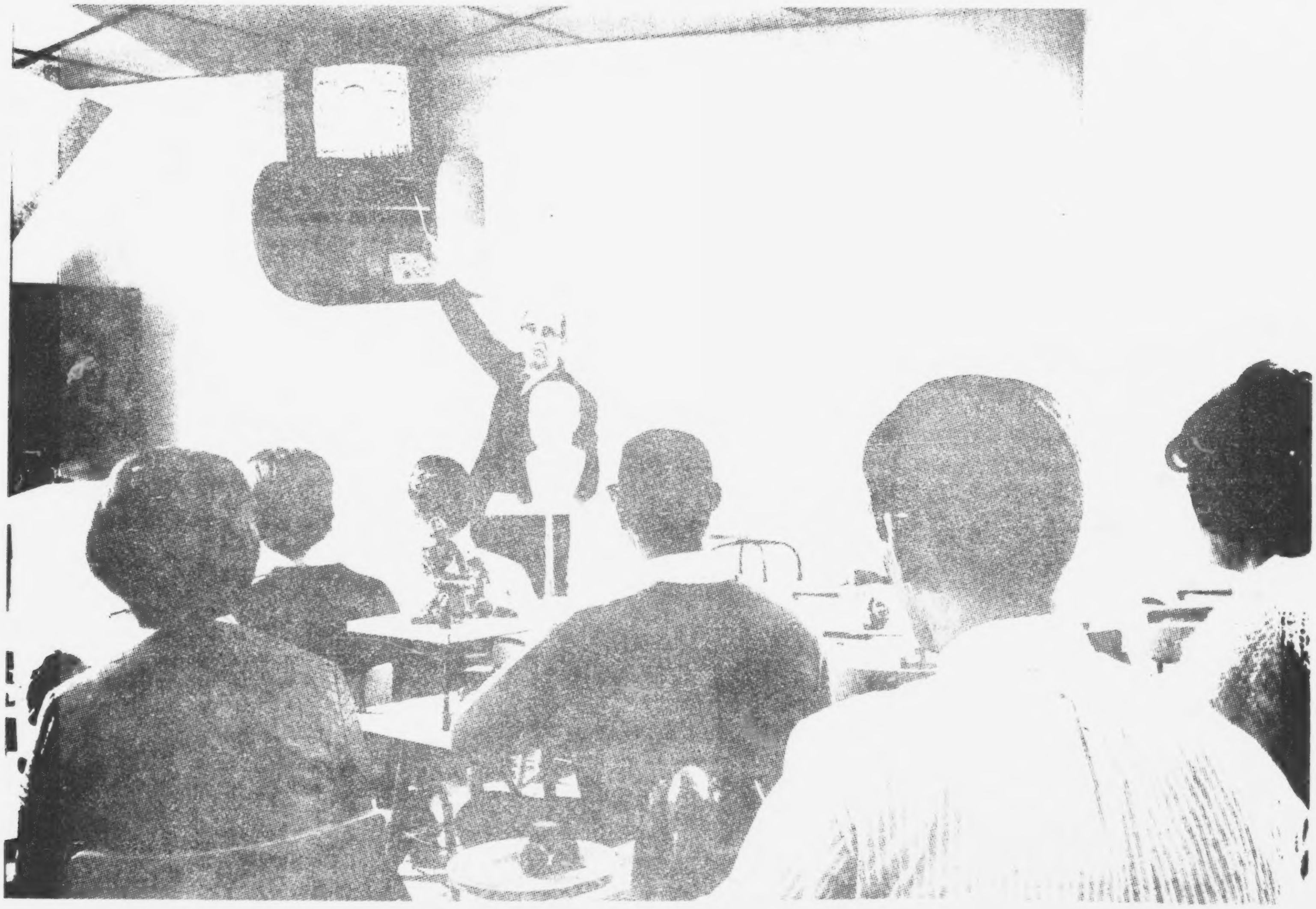
AUDIO TAPE DECKS AT ORAL ROBERTS UNIVERSITY



Audio programming on tape provide important instructional material for dial system as well as the large video capability at Oral Roberts University.

TELEVISION PRODUCTION MASTER CONTROL ROOM





Audio video sources in the classroom by dial access.

STUDENT IN CARREL WITH AUDIO-VIDEO RECEPTION

CARREL GROUPS IN LIBRARY AT ORAL ROBERTS UNIVERSITY

The library is a popular place for student carrel because of central location, supervised environment and proximity to reference materials.

B. RATIONALE

In recent years, an increase in student population and a shortage of teachers combined with an information explosion has created a situation in which effectiveness of conventional teaching methods has been challenged. Educators are looking to new technologies to assist them to respond to the increased demands effectively and to improve the quality of modern education through the individualization of instruction. The remote access retrieval system provides a potential solution to the dilemma.

Dial access places audio-visual materials at the fingertips of teachers and students alike. The convenience, ease of operation, and "immediacy" of access provided by the system enables teachers to make extensive use of this type of material and, in addition, eliminates the previously time-consuming tasks of gathering information, setting up and operating equipment properly. The flexibility of access makes programs available to individuals, as well as groups, either on a random access basis or pre-scheduled basis.

Dial access individualizes instruction by providing independent study. A student in an individual carrel may repeat a tape as often as he wishes or feels necessary for his individual purpose. Instructors may assign additional tapes for students who need remedial or review instruction. The system also adds interest and motivation by employing sight and sound, especially for those students who require more motivation than others.

Instructors who tape their group presentations are freed from the necessity of repeating the factual content of instruction. Thus, more class time may be devoted to analysis and discussion of concepts and their practical application. Rather than dehumanizing and depersonalizing the instructional process, as some detractors of the system contend, dial access systems can actually provide the opportunity for closer contact between students and teachers.

Implementation of the system provides the instructor with a potential for greater teaching effectiveness. Extensive material for enrichment and instructional support, such as music, poetry readings, recorded dramas, great speeches by famous people, recorded psychological and sociological case interviews, recorded moments of history, films of other nations or communities, are immediately available for inclusion in his presentation or assignments. In addition, tele-lectures -- long-distance telephone reception of outstanding instructors, lecturers, actors, politicians, and other professional experts -- can be brought to the students through the dial access system.

It also allows students who have been absent from class to make up lectures they have missed. For all students, taped class presentations are made available, as well, for further study and review. Moreover, lessons which are recorded "for the record" are often prepared and "performed" better than "live" presentations.

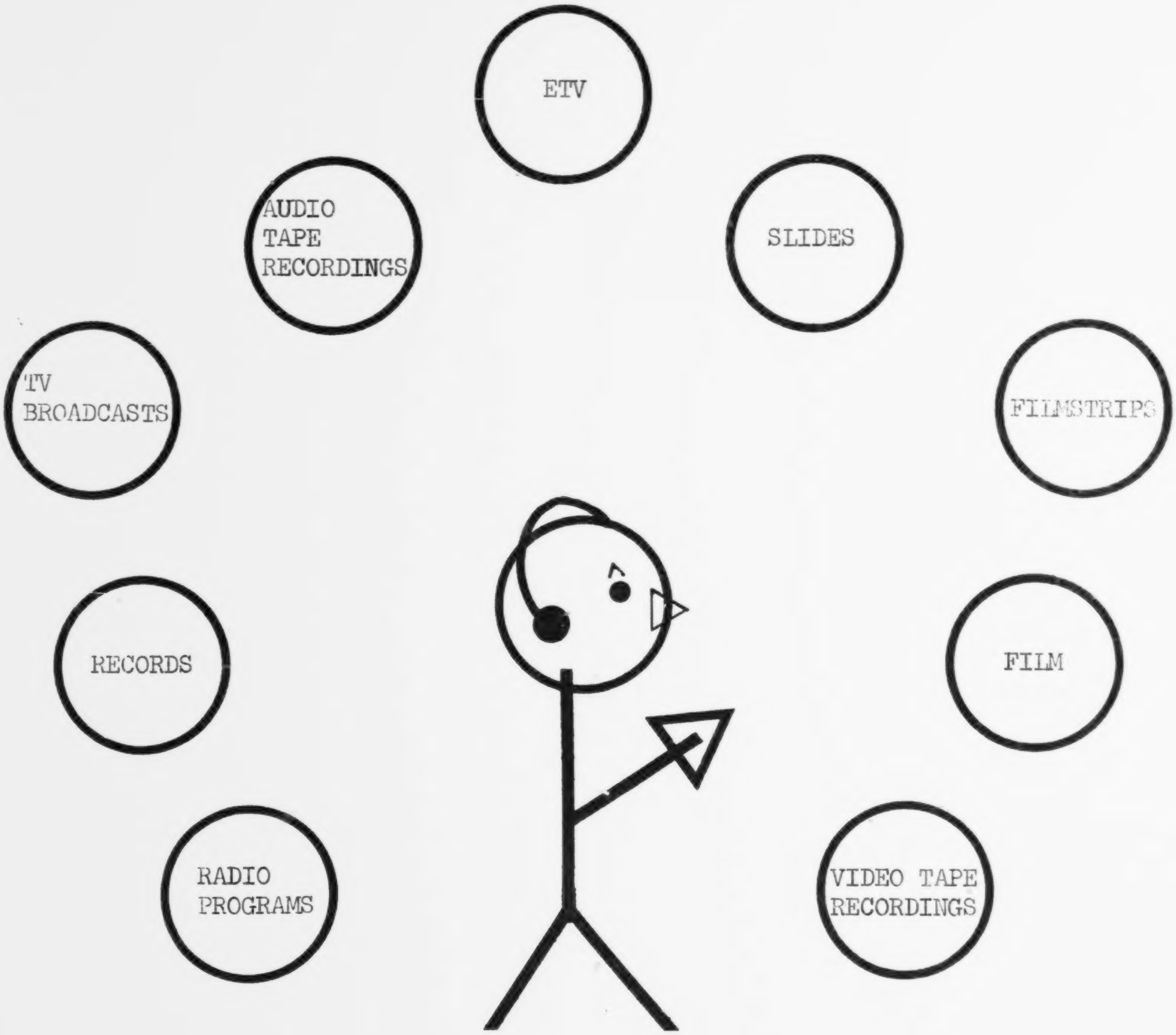
The dial access system eliminates, for the user, the rigidities of mass media, i.e., television and radio, which operate on a scheduled time basis. Teachers can schedule programs for current use on the system, allowing students to listen or view at their convenience. In some institutions, provision is made for the student to call in for a program from the tape library for set-up and play-back on the system.

The effectiveness of programmed instruction can be enhanced by the use of the system and the materials it makes available. Student response in conjunction with listening reinforces the learning process.

The dial access system can be of great value in in-service and student-teacher training since it affords the "instructor" the opportunity to play back his lesson in order to hear and observe his approach and techniques in relation to lesson material and to measure performance. Students and teachers of speech and drama classes consider the immediate play-back of taped performances, made possible by the system, a valuable learning experience.

The use of a variety of methods to teach specific skills, such as typing from recorded dictation, taking shorthand, or speaking a foreign language, is effectively served by the dial access system.

The design of the system allows for expansion, making it possible to increase the number of program sources and/or the number of student receiving stations at will. In addition, if a system is initially only an audio installation, video capability can be


ETV
AUDIO TAPE RECORDINGS
SLIDES
TV BROADCASTS
FILMSTRIPS
RECORDS
FILM
RADIO PROGRAMS
VIDEO TAPE RECORDINGS

DIAL ACCESS satisfies an increasing need in education to link up students and teachers with the multiplicity of media resources for a more effective learning situation.

added easily.

With the growing concern to all schools of the increasing number of students, the lack of teachers, and the information explosion, educators are looking to new technologies to provide a means of meeting these problems while at the same time enhancing the quality of education through individualizing instruction. Remote access retrieval systems offer a potential toward achieving this goal.

Many arguments in favor of the remote access retrieval system have been heard in the course of our survey. Opposition to the technology seems to center on the doubt that its accomplishments and capabilities justify the cost involved in comparison to the use of small tape recorders and film projectors. Until research and experience make more knowledge available concerning the utilization and effectiveness of the remote access system, its rationale must be weighed with reservations.

In brief summary, the arguments put forward for dial access systems are:

1. "Immediate" access to selected audio visual materials.
2. Fuller utilization of materials through convenience and availability.
3. Avoids rigidities of mass media.
4. Free teachers for more effective and meaningful role.
5. Individualizes instruction.
6. Provides for make-up and review.
7. Brings greater resources to instruction through sight and sound.
8. Recording of materials improves the quality of performance.
9. Provides additional means for teaching specific skills.
10. Offers flexibility in use from supplemental to complete content presentation.
11. Adds interest and motivation through sight and sound.
12. Offers in-service and pre-service training by recording and playing back performances and by dialing into programs advancing professional expertise.
13. Expanding of systems to any number of program and receiving stations.

14. Placement of equipment at one central location, thus decreasing handling and facilitating maintenance.

15. Potential of enhancing programmed instruction techniques through audio-video dimension.

Arguments against dial access systems are:

1. Only high cost, sophisticated systems a) provide for student controls (stop, start, reverse, forward), after program has begun, b) or provide for the entry of every student into the beginning of the program.

2. Lack of demonstrated cost effectiveness.

3. Lack of adequate research to prove instructional effectiveness.

4. Lack of high quality materials for use in the system.

C. HISTORICAL BACKGROUND

Dial access systems have become a reality within the past few years. They began as an outgrowth of the language laboratory movement which was greatly stimulated by the availability of federal funds in the late '50's. In time it became evident that a student could receive audio information in other subject areas as well as foreign language. Further reasoning established the possibility that a student could satisfy his needs by dialing the exact program from a bank of stored material.

The first experiment in the use of conventional dial selectors and associated switching equipment to permit individual access to learning materials took place at the University of Michigan in 1961. Under the direction of Dr. F. Rand Morton, the first dial language laboratory was installed with 108 audio channels.

The early movement centered in New England at colleges and private schools, involving language laboratories (Nassau College, University of Connecticut, Trinity College, Yale University, Wesleyan University, Hotchkiss School). The potential value of the system in other subject areas was quickly recognized and its use spread gradually to the teaching of music, poetry, drama and subjects such as speech and dictation.

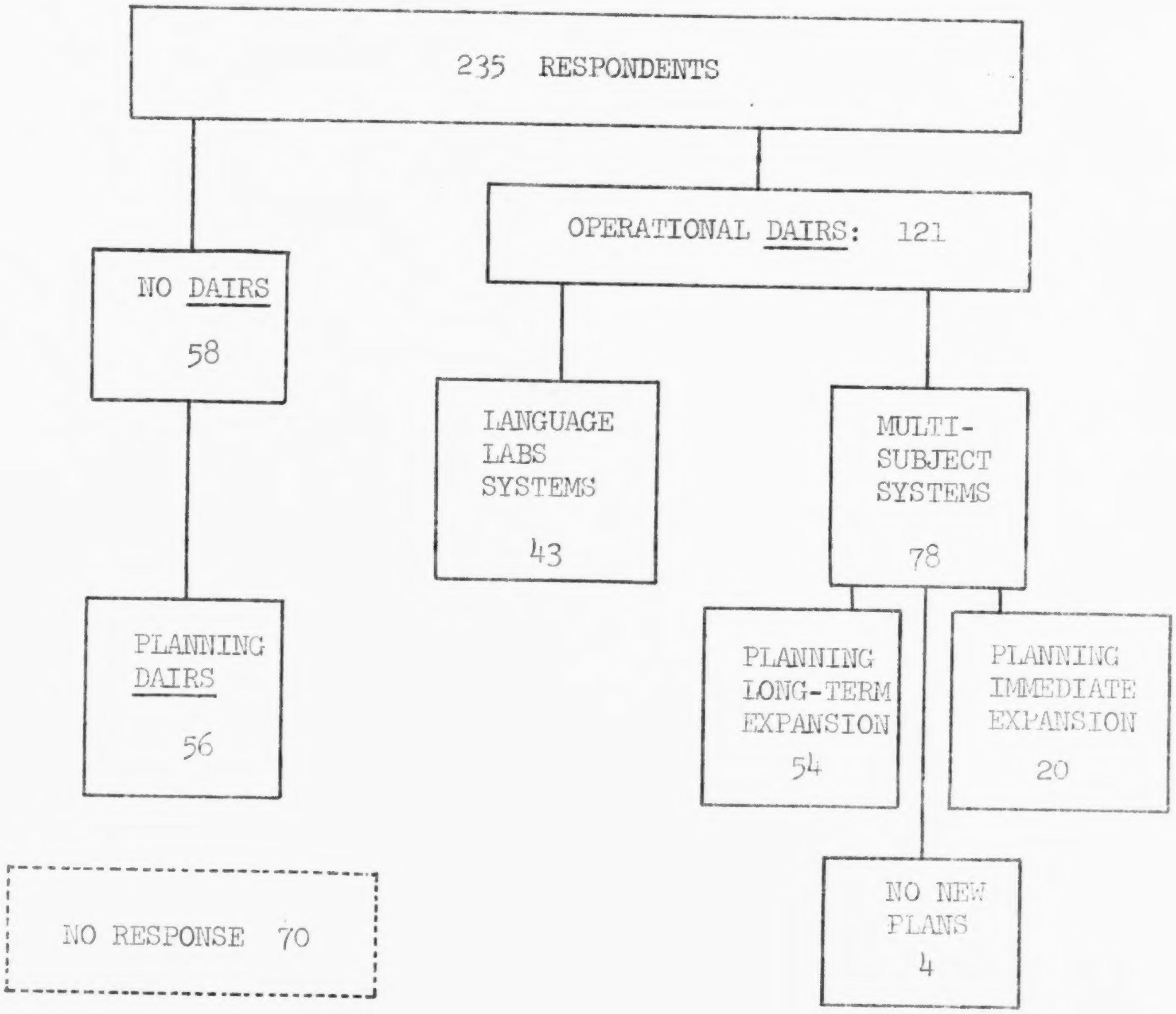
The year of the breakthrough for dial access as a multi-subject audic-video instructional technology came in late 1965 when Ohio State University, Oklahoma Christian College, Oral Roberts University, and Grand Valley State College installed major facilities. Much publicity was given to these systems which led to a great deal of interest in their utilization.

The installation at Oklahoma Christian is the most ambitious and innovative; each student has been assigned a personal study carrel with dial retrieval. With 850 receiving stations in its Learning Resource Center, it is by far the largest of the audio systems. Ohio State University opened its dial access audio facility as a listening center with 150 carrels. The number of carrels was later increased to 372, which were located in various buildings (including dormitories) throughout the large campus on the assumption that their use would increase as the students found them more accessible. Since the central control room currently receives forty thousand calls per week, this assumption was obviously correct. Oral Roberts University was the first to install an extensive dial access video facility of 90 carrels in its new learning center which houses the library, classrooms, and auditorium. A closed-circuit television operation is an important adjunct in providing program material for their system. Grand Valley State College, Michigan, provided audio dial access in over 100 carrels. This system employs a television facility that can be received by the system but cannot be dialed.

These installations marked the firm establishment of dial access systems and provided the springboard for those which have mushroomed since 1965 to approximately 200 at the present writing. By the Spring of 1968, 121 in 38 states had been established with 56 institutions planning to install systems.

D. STATE OF THE ART PROFILE

In conducting the State of the Art Study of Dial Access systems, the Center for Educational Technology mailed over 300 Questionnaires to educational institutions throughout the United States. Responses were received from 235 institutions by March 31, 1968. Of these, over half (121) were operating Dial Access systems. This included 43 schools where the system is utilized exclusively in a language laboratory. The other 78 institutions were employing multi-subject Dial Access Information Retrieval Systems.


235 RESPONDENTS
NO DAIRS 58
OPERATIONAL DAIRS: 121
LANGUAGE LABS SYSTEMS 43
MULTI-SUBJECT SYSTEMS 78
PLANNING DAIRS 56
PLANNING LONG-TERM EXPANSION 54
PLANNING IMMEDIATE EXPANSION 20
NO NEW PLANS 4
NO RESPONSE 70

QUESTIONNAIRE RESPONSE ON OPERATIONAL SYSTEMS

Fifty-six institutions responded that they were planning to install a Dial Access system, and by publication date of this handbook, some will have operational systems. (See Figure 1 in Appendix B).

Nearly two-thirds (47) of the operational institutions planned long-term expansion of their systems; twenty other schools planned immediate expansion. In many instances video capability will be added to existing audio systems. Others will increase the number of receiving stations and expand their program sources.

The largest system in operation, with only audio capability, is in a college where each student is assigned a study carrel.

The smallest audio system is at the elementary level, and has six individual stations and three classroom stations.

The median number of audio receiving stations was 35, although the highest frequency occurred in the range of 21 to 30 stations. (See Figure 2 in Appendix B).

The largest number of video receiving stations as well as the smallest was reported at the college level. The median number of video stations for all educational levels combined was 18.

Not all institutions responded to questions regarding costs and financing, but of those 94 institutions providing information on initial cost of installation, 19 invested between 10 and 19 thousand dollars; 12 invested between 20 and 29 thousand; 15 invested between 30 and 39 thousand; and 11 institutions (9 were colleges) invested $100,000 or more. The median amount of initial cost was $40,000. (See Figure 3, Appendix B).

Answers regarding instructional use of the Dial Access system elicited information that 45 per cent of usage is for teacher-mediated instruction; about 45 per cent is for enrichment, and the remaining 10 per cent is for use in review, remedial teaching, and primary presentation of course content.

Only 25 per cent of the responding institutions indicated that they were engaged in any type of evaluation of their Dial Access systems, and a mere 4 per cent were actively engaged in research on the educational efficiency of dial access.

Appendix B contains an analysis of the data and findings of the Dial Access study conducted by the Center for Educational Technology of the Catholic University of America.

E. FUTURE

The substantial interest in dial access systems over the past several years appears to insure the continued development of this convenient electronic retrieval system for audiovisual materials. New refinements in technology should help to overcome some of the arguments against its use. High-speed dubbing from a master to a blank tape is a late development which permits a student to have private access to his own audio-tape within sixty seconds of dialing in. By "private" we mean that each time a student dials a program, the master is duplicated and the student receives the copy of his listening station. The master tape rewinds, ready for use by the next student who dials the program.

Private random access has paved the way for equipment to provide student control over taped lesson material through forward, reverse, and stop capability. No solution to private access to video tape sources has yet been found, because of the inability to duplicate video tape at high speed.

A definite possibility is an increased linking of systems to create a network of institutions with access to a central resource storage area where audio and audio-visual materials may be dialed from any building in the system. Eventually, the community itself may have home dial access to a central audio-visual library source. This could be one of the next big developments in the communication arts. Already, home dial-in is in operation on a simplified scale in a number of areas. In Wisconsin doctors can dial information from any one of 175 medical tapes on file. The Illinois State Department of Education is providing educators with a similar opportunity through a "Dial-In-Ed" experimental program.

It appears safe to predict that the use of dial access in the classroom will increase, especially as the instructor's multi-media, electronically-controlled lectern-desk becomes more popular.

It is both possible and probable that arrangements will be made between school districts and colleges for the exchange of materials, techniques, and ideas. Workshops and seminars can be instituted in which educators may discuss their ideas, sources, and experience with the integration of media within their specific subject area. Universities now can undertake to set up centers to create audio-visual instructional materials themselves.

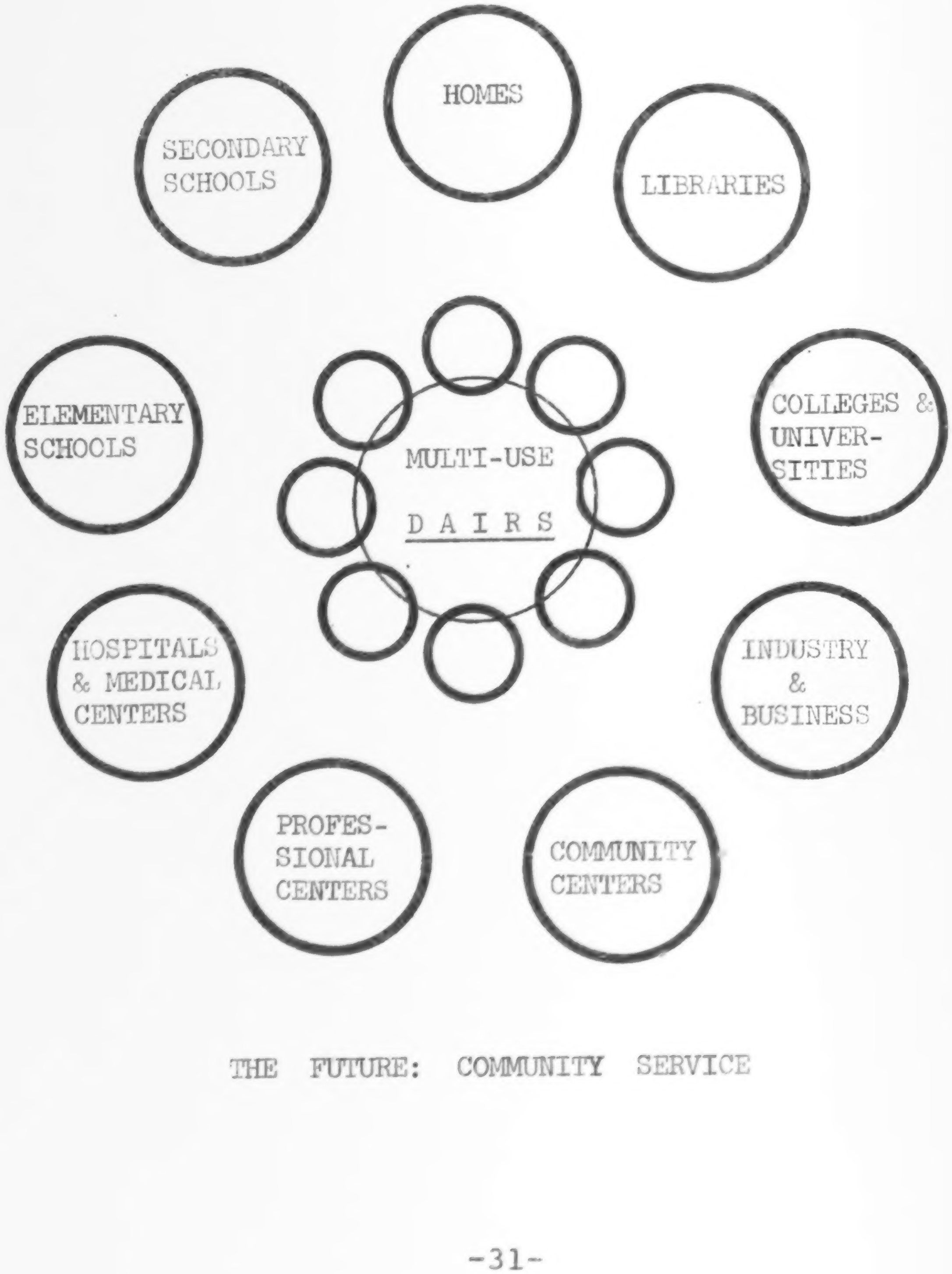
How dial access can be integrated with other electronic systems in use is the immediate question posed by many educators. To a great extent they can supplement each other. ITV is a mass dissemination system and necessarily must be scheduled. Dial access provides individual retrieval. ITV, however, makes actual production of video tapes possible, which can then be stored in a dial access system for individual, scheduled or classroom retrieval. CAI, on the other hand, provides for individualized instruction, but is basically an interacting print-out medium whether typewriter or cathode ray tube interface is used. It can, however, activate and select slides, audio tapes, or films if the proper equipment is set up at the individual student's terminal. However, at this stage in technological development, audio or visual material which requires extended time for listening or seeing is a very expensive use of a computer terminal, especially when the student can be referred to a study carrel to dial the desired material himself. The computer can be utilized for instruction based on individual student needs; the dial system can then be utilized by the student in the execution of the prescribed program. In other words, the computer diagnoses and prescribes and the dial access system fills the prescription. The student will get his instructional path prescribed by the computer, dial for modular sequences of instruction, and then return to the computer terminal for further instruction and guidance along the learning path.

Two recent developments that can have an important impact on the future of the remote access retrieval system are compressed speech and electronic video recording. The EVR system makes it possible to show on any conventional television set prerecorded programming from motion picture film and video tape at a low cost. It involves an electronic process of transferring any film or video taped material to a special 8.75 mm unperforated thin film, storing it in a 7" by 1/2" cartridge, and inserting it in a special "player" attached to the antenna terminals of the television set where it is automatically threaded, played, rewound, and ejected. The player, roughly the size of a bread box, can serve one receiver in a single classroom or receivers in all the classrooms of a school. The specially processed film can be stopped anywhere for static display and played frame by frame. The estimated cost of a 20-minute educational film will be seven dollars. Dr. Peter C. Goldmark, President and Director of Research, CBS Laboratories, spearheaded development of EVR.

The development of compressed speech potentially can result in a significant reduction in the time required to place lecture material on the system. Studies undertaken by the American Institutes for Research of Silver Spring, Maryland, indicate that increases in the speed of speech to one and one-half to two times the normal produce no significant loss in comprehension and that comprehension of rapid speech is a skill which can be acquired by training. The present method of compressing speech does not affect pitch or overall patterns of intonation. The following illustrate the potential positive effect of compressed speech on the use of the dial access system: a) Re-presenting class lecture material at high speed as a review. b) Improved comprehension of normal speed presentations. c) Better retention due to the closer attention required. d) Increasing the amount of material given.

The future success of any technology is going to depend largely on its use or abuse. Dial access systems are no exception. Dial access is no panacea as an instructional technology and is relatively expensive. However, it does offer a practical and convenient electronic distribution system for audio-visual materials, and a tool for individualizing instruction. How to use it is the key.

Remote access to audio or video information offers an unlimited potential on all levels of education to serve both student and teacher. Its future applicability to the home can have a revolutionary role in the continuing education of our nation's citizens. The success of this electronic distribution system will depend largely on the manner in which it is used and the quality of materials that are produced for it. Herein lies the key to the future.


HOMES
SECONDARY SCHOOLS
LIBRARIES
ELEMENTARY SCHOOLS
MULTI-USE
DAIRS
COLLEGES & UNIVER-SITIES
HOSPITALS & MEDICAL CENTERS
INDUSTRY & BUSINESS
PROFES-SIONAL CENTERS
COMMUNITY CENTERS

THE FUTURE: COMMUNITY SERVICE

II. GUIDELINES

A. ADMINISTRATORS

Those spearheading the present drive toward quality education for all are looking more and more toward technology's storehouse of machines to help them in achieving their goal. However, the major problem facing educators today is not a lack of either simple or sophisticated technical devices to assist teachers, but the lack of clear objectives for the learner, materials to feed into the devices, and innovative ways to use them for more effective learning. It is with particular emphasis in this area that we provide the following guidelines for the effective planning, implementation and evaluation of a dial access retrieval system.

Making The Decision

The first questions that should arise in the process of "making the decision" are: What educational objectives will a dial access system help achieve? What traditional classroom techniques and administrative procedures will make the most effective use of a dial access system?

To find an answer, let us first look at the system's capabilities. We can say, without question, that the system provides a means for individualizing instruction by presenting instructional material to a single learner to meet his needs. This is a primary advantage. We all realize, with increasing urgency, that we must break away from the conventional lock-step classroom concept and begin to take individual student differences into consideration. Dial access helps us accomplish this.

Another useful role that dial access can play is to make audio and visual materials consistently and immediately available to the teacher, who simply dials the appropriate number. This can bring much relief from worry about obtaining the material when needed, arranging for the equipment, and making it operate satisfactorily.

The system's capacity to store and make readily available lectures and demonstrations frees the teacher from much of the routine dispensing of information. The time saved can be devoted to the more human side of teaching: counseling, diagnosing, inspiring. As the role of the teacher changes, he will become less a presenter of information and more an analyst of student progress, a prescriber of learning materials -- in short, a manager of individualized learning.

Thus, you will need to consider the system's place in your over-all educational program -- whether it will serve independent study and/or group work; whether it will be used for primary, supplementary, enrichment and/or remedial instruction; and what type and number of courses it will include. Above all, you must determine what specific instructional needs -- what learning problems -- a dial access information retrieval system can help you solve.

Remember that only with faculty involvement, participation, and commitment can the use of any dial access system be successfully developed. The faculty should be part of the decision-making process from its inception. Where possible, department heads should be represented on the planning committee in order to encourage interest and acceptance by the faculty members under them.

Before coming to a decision it is recommended that literature on the subject be studied, and visits made to school systems similar to yours that have dial access. It is well to consider, in a general way, what equipment you will require to achieve your educational objectives. You then will get some idea whether you can afford what you are planning. Your estimate of hardware requirements will be affected by the number and type of receiver stations, the distances of receiver from transmission source, the number of program sources, whether the system is to be audio or audio-video, and the capacity of your installation for future expansion.

In analyzing costs, the alternative method of having students check out equipment and materials through the library or material resource center should be considered in lieu of electronic access by dial. This method has its advantages in accomplishing similar objectives at greatly reduced cost, but will involve a proliferation of equipment to be handled and materials to be duplicated. As the system grows larger, any change-over to remote access becomes more expensive.

As previously stated, faculty involvement is essential for success. Before arriving at a final decision, make sure faculty is receptive to the system since they will not only determine the quality of materials used, but the amount of use and student attitudes toward it. If they are not interested in planning for and using it, the program has little chance of succeeding. Make sure that those involved in major curricular and instructional changes are in on the decision to insure a unified commitment.

Pre-Installation Planning

If your decision is to acquire a remote access system, proceed to set up the planning committees. One committee should be established to make all decisions relating to hardware for the system (i.e., carrel design, number, location; number of program sources; controls for user; personnel, etc.). At the same time, another committee must be established to plan the software development. Don't wait until the hardware arrives to begin considering the materials to be used. Start planning and developing the software as soon as the "go" decision has been made. The key to a successful dial access system is to have sufficient intructional programs available to make efficient use of the equipment from the start of installation.

Shopping for Hardware

The hardware field is highly competitive. Much of the equipment has been converted over a period of time from consumer products, to language laboratories, to dial access systems. All companies are not equally capable of providing the full range of equipment that you may require to meet your educational objectives, nor are they equally capable of providing the quality of service agreements you will need. Specifications that the equipment will meet can differ (i.e., frequency range, noise level to signal level, distortion, etc.) as reflected in the equipment specification charts included in Appendix D.

Before you completely spell out your equipment specifications, get in touch with or visit well-established installations on your academic level. Bring along your own technical expert and talk to the maintenance personnel or operators. The following are some questions you might ask:

Did the manufacturer build the system to meet your specifications?

How cooperative was he?

Did he give prompt delivery?

Were you satisfied with the installation?

What were the major service problems?

Are spare parts readily available?

Are the repair technicians of the company competent?

Has the supplier taken interest in the system after the installation?

Would you choose a different manufacturer now? If so, why?

These visits will not only provide a good opportunity to weigh cost against quality, but at the same time, make possible a better understanding of the technical aspect of a system. Moreover, conversation will produce candid comments that would never be found in the literature. It would prove valuable to review the original equipment specifications of your host installation and discuss how, in the light of present experience, the specifications have been found inadequate.

If you do not have a first-class technical person with broadcasting equipment experience on your staff, it would be well to employ an engineering consultant experienced in communications electronics -- one you have complete confidence in to understand your objectives and direct you toward their fulfillment. You should, of course, have your faculty committee participate as often as possible in the decision-making and, by all means, solicit the opinions and advice of the users -- your students. Involvement can insure enthusiasm that may not have existed before. A great many areas of decisions involved are not strictly technical. Students can be involved in planning the design of the study carrels, for instance, or in a discussion of the type of controls needed in the carrels. The atmosphere of a carrel, as well as its location, are both important factors in determining whether the carrel will be used for serious study rather than informal social interaction. Do not overlook the "little things" because they become "major" as you increase the number and locations of carrels.

Based on your findings and recommendations, presented in the light of your educational objectives, the equipment specifications can be drafted. The actual write-up will require the expert assistance of your technical personnel or consultant. Be sure that your design facilitates expansion at any time without any of the original equipment becoming obsolete. Concurrent with the drafting of the specifications, there should be a preliminary study of software and software sources so that a review can be made to determine necessary modifications of the equipment specifications. Once finalized, the system specifications can be submitted for bids.

It is recommended that before making your final choice, you visit the manufacturing plans with your technical adviser. You will be welcomed by the serious bidders who will be happy to show you around and have you talk to their personnel. Do not let sales personnel monopolize your attention. Be sure the design people are there to answer your questions. Carefully observe assembly, testing, and quality control procedures. Assure yourself of the company's capacity to provide the modifications to standard equipment that your system requires. If they can't, the chances are that there may be problems later. Be sure you arrange for a contract to provide fast and dependable maintenance service. A delay in the repair of a breakdown in the system can play havoc with your instructional scheduling.

The lowest bid should not necessarily be the basis for awarding a contract. Quality counts both in performance and in long range savings. Getting a company to deliver on its promises to meet your specifications is important. Institutions having established installations can provide you with information on the reliability of the manufacturer with whom you have dealt. A contract with a supplier is tantamount to being wedded to their systems for future expansion.

Your technical person must be present when the equipment is being installed and should receive a briefing on the system at the factory so that minor repairs and trouble shooting can be undertaken quickly.

Equipment Costs

The first questions coming to an educator's mind considering a dial access system are, "How much is it going to cost?" or "What kind of a system can be purchased for so many dollars in my budget?" Without knowing the specific functions the system is required to perform, these questions would be difficult to answer. As set forth in the guidelines for technical personnel, many variables must be considered in determining the capability of a system. Thus, the cost of two different installations with the same number of carrels and program sources can vary markedly.

For those who are looking for an estimate, average cost figures for a 30 to 40 carrel installation, audio-listen-only, can be projected on the basis of $200 for a carrel or student position (carrel, dial, headset), $300 per carrel for switching equipment and power source, and $500 for each program source. The latter figure is based on a four-track tape machine to carry a like number of programs. The cost does not vary too much whether you purchase a recorder for one or four tracks. For an audio-active capability (student hears himself simultaneously), add about $35 per student position. To the total cost of your system, add 15 per cent for installation within a confined area. Those who want an audio-active-record feature, providing each student with remote control of his own program (stop, start, forward, reverse), would have to more than double the cost of a listen-only system.

On the other hand, with a portable tape recorder and an additional audio outlet, the student could plug into the system and record the program material for his personal use.

Adding video reception capability involves a substantial increase to the cost of any installation. Each video program source requires a video playback machine at about $4000. To transmit films, a film chain (film projector and TV camera) is necessary at $2000. For slides the cost is $1000 plus the price of a standard slide projector. The student position is the same cost as audio, $200, except for the addition of a monitor at $200. The switching mechanism that activates and feeds the program source to the carrel amounts to $100 per program source per carrel. A considerable saving can be made on the latter cost if a regular TV set is used with channels 2-13 tuned to the particular program sources. This eliminates the cost of the expensive switching gear, but requires the addition of a modulator for each program source.

For those interested in color, a good quality tape playback machine surprisingly sells for only $4700. Each student position would require a color monitor at $450.

To equip a quality television production studio for black and white reception, except to pay from $35,000 up (tripling the figure for color). However, there are self-contained, mobile, production units (TV camera, recorder and monitor) that run as low as $2000. These are excellent vehicles for teachers to familiarize themselves with the equipment, to critique their performance, and to tape their own materials without a production crew following their every move. They provide a solid preparation for the installation of a production studio.

Bear in mind that the costs used above represent rough estimates in order to provide a basis for making calculations. Prices will differ markedly, depending on the special requirements of the educational objectives that determine the equipment specifications. The guidelines for technical personnel provide a detailed analysis of the many variables involved.

Developing the Software

Since materials and programs are the key to a successful utilization of any system, it is essential that an adequate supply be on hand when the new equipment arrives. The planning and preparation of these materials is an area which will benefit from the involvement of teachers and this involvement can, in turn, inspire commitment to the use of the system by the faculty. This can be approached in various ways.

There is no better way of getting ideas, techniques, and source materials for the various subject areas than to interview faculty at operating installations on your academic level. Your visits to established installations suggested in the previous section on hardware development can be used to advantage in your development of software for your system. Be sure your key faculty personnel are present since their active participation in the implementation of the system will encourage participation by their subordinates.

If budget considerations make the visits inadvisable, much information and valuable advice may still be obtained through correspondence or by telephone contact. At any rate, we strongly advise seeking assistance from those with experience in utilizing a dial access system.

Search for Audio-Visual Materials:

A popular bibliographic reference to audio-visual materials for educational use is the Educational Media Index, published by McGraw-Hill, New York. Individual volumes are devoted to specific subject areas. Another very helpful reference is Guides to Newer Educational Media, published by the American Library Association, Chicago. For audio sources only, the National Audio Tape repository in Boulder, Colorado, issues an extensive catalog of tapes selected on the basis of relevancy to the curriculum and quality of production. For video, the Great Plains Instructional Television Library publishes a Catalog of Recorded Television Courses, listing some of the best lesson material available in this medium. All the above publications should be available in any comprehensive library. In the field of free materials, there are the Educators Guide to Free Tapes, Scripts, and Transcriptions, and the Educators Guide to Free Films, both published by Educators Progress Service, Randolph, Wisconsin, and revised annually. In addition, quality media production companies should be contacted for their catalogs. The programs of educational radio and TV stations offer a valuable source for taped program material. These and other source references are cited in Appendix C of this handbook.

Workshops:

Invite faculty members who have shown imagination in their use of the dial access system in their institution to exchange ideas, methods and sources of materials with your staff. Consultants and curriculum specialists should also be called in if the budget permits. These workshop sessions will be more effective if teachers plan and prepare integrated lesson and course materials in advance, to be presented to small discussion groups within the workshop for critique.

Based on an evaluation of the results of the workshop, teachers should be able to secure approval for needed funds to develop and implement their instructional materials. Set target dates with teachers for the submission of their plans. Throughout this stage maximum encouragement and support of faculty efforts should be provided.

Tape Recorders:

Issuance of recorders to teachers is a practical way of getting them to experiment with the use of tapes, as well as providing them with the opportunity to hear themselves present material. The latter can often have a disturbing but beneficial effect. Having a recorder available also offers the teacher an opportunity to develop original material, as well as to duplicate and adapt educational programs from radio and television, records, etc.

The Value of the Librarian:

A librarian can be invaluable in assisting with the search for, ordering and cataloging of audio-visual materials as they are developed or selected. Knowing what is already available in a subject area and where to get additional or similar items promptly can facilitate and therefore encourage the teacher to use the system. The librarian will also be an important asset in keeping the teacher advised on new materials.

Remember: software is very important, but faculty involvement and attitude are the keys to the selection and development of the software and its ultimate effective utilization.

Faculty Involvement in Using the System

Dial access should not be "sold" to faculty as an answer to all their teaching problems. It is an extension of what teachers are already doing -- a tool in teaching, as electricity is a tool in living. When the concept is properly presented, the teacher will realize that dial access is one technology that possesses a remarkably wide range of utilization, i.e., from enrichment and supplementary use to complete content presentations and individualized instruction. To individualize the core curriculum by dial access means that all visual and audio materials will be made available for utilization at will, thus providing a real potential for greater teaching effectiveness.

The faculty is much more likely to get involved with the new system if it is supplied with:

(a) Strong administrative commitment and leadership.

(b) Incentives: released time, compensation, travel funds, etc.

(c) Expert assistance in production and selection of materials.

(d) Latitude in choosing and using materials.

(e) Financial support to purchase/rent and produce materials.

(f) Workshops to stimulate ideas through contacts with colleagues from other institutions pursuing similar objectives in their subject fields.

(g) Freedom to start in a small way.

Teachers will find that the flexibility of use of the system is such that it can easily be adapted to their individual needs and objectives. These uses generally fall into the areas of:

(a) Review.

(b) Supplemental.

(c) Enrichment.

(d) Remedial.

(e) Major content presentation.

(See in Guidelines for Teachers a list of specific uses that fall in the above categories.)

As previously stated, early involvement of the faculty is an important key to the effective use of any system. Planning committees should exist as long as there is a program, and the program should grow in a step-by-step manner as materials are developed and used. The equipment, of course, should serve the program, and not vice versa.

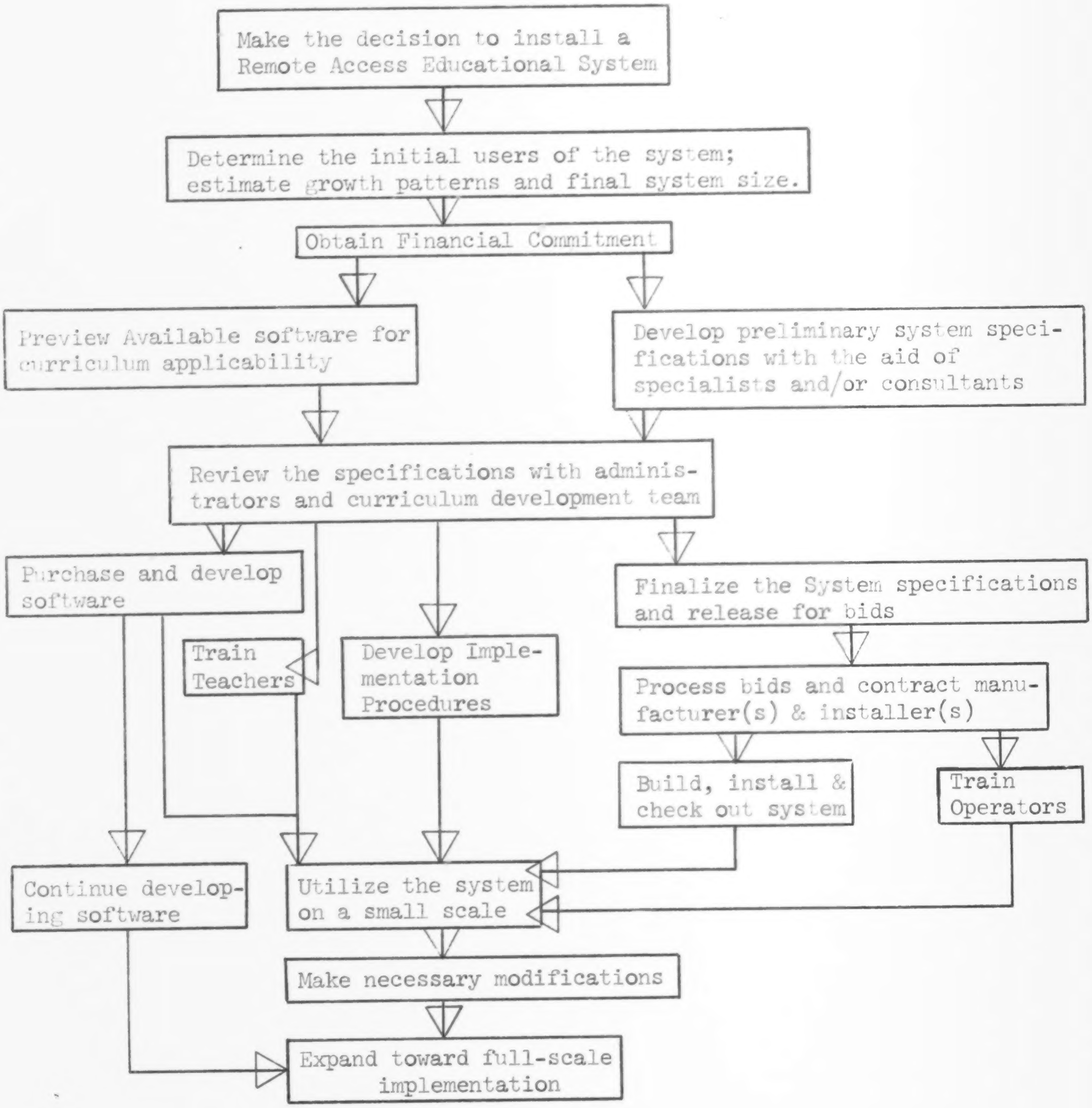
Proper communication between teachers, librarians, and A/V media people is very important. If the latter lack teaching experience, they may fail to understand and identify with the teacher and his instructional objectives and problems. The media person's concern with the hardware and production aspects can make him less sympathetic with the teacher and his needs. In selecting a media person, be sure he knows his limitations and does not alienate the teacher by advising him how to handle his subject specialty. The media man's function is to assist the teacher in achieving the most effective learning experience through the use of audio visual materials and equipment. Moreover, the administration should not shift the responsibility for the success of the system to the A/V media specialist.

Direction and encouragement of the faculty (through incentives, materials, expertise) should prevail over any threat the system poses to them. The younger faculty often provide the most effective utilization of a system initially. If expert assistance is made readily available and the equipment provided is of high quality, teachers can be assured that the tapes they produce will be of high quality. Thus, professional attitudes can be developed and professional results achieved.

Post-Installation Concerns

Problems will be encountered in the operation of even the most well-planned system. In this section we will examine some of the problems that can arise and discuss some possible solutions.

STEPS TO BE TAKEN IN PROCEEDING FROM THE COMMITMENT TO INSTALL A REMOTE ACCESS SYSTEM THROUGH THE OPERATION OF THE SYSTEM


Make the decision to install a Remote Access Educational System
Determine the initial users of the system; estimate growth patterns and final system size.
Obtain Financial Commitment
Preview Available software for curriculum applicability
Develop preliminary system specifications with the aid of specialists and/or consultants
Review the specifications with administrators and curriculum development team
Purchase and develop software
Train Teachers
Develop Implementation Procedures
Finalize the System specifications and release for bids
Process bids and contract manufacturer(s) & installer(s)
Build, install & check out system
Train Operators
Continue developing software
Utilize the system on a small scale
Make necessary modifications
Expand toward full-scale implementation

Technical:

The most immediate problem could be malfunctioning of the system itself, or the lack of features that were desired but overlooked, or not spelled out in the specifications, or not properly incorporated into the installation. This points up the importance of having a technical consultant plan your system with you and check it out after installation. Many institutions have a technical specialist on staff, but if you do not, the retention of a consultant could save much time, expense and grief. He should be fully knowledgeable in communications engineering, particularly radio and television technology. In larger systems, experience with computers would help. A good engineering consultant should have vision to see beyond the confines of dial access technology per se. Avoid the obvious trap of considering a technical consultant in the category of a maintenance technician.

A contract should be signed with the installer to provide continuous service to the system. Expert maintenance should be readily available since any prolonged breakdown causes serious disruption to the curriculum. For normal maintenance -- minor problems and troubleshooting -- a competent technical person should always be on hand to make adjustments to keep the system working effeciently and to avoid unnecessary service calls to the company. He should also keep a constant check on the need for spare parts.

In addition, it is also wise to set up procedures for the types of failures in components that may affect the whole system. Generally, the installing company can be helpful in this respect. A case in point involves one large institution which had a serious problem when a computer component failed. With the failure, the whole system was down . . . and this, just prior to semester exams. Fortunately, the institution was able, through its own expertise, to devise a method of routing selected programs on a continuous play basis to designated carrels . . . thus relieving a very difficult situation.

If the original system specifications are not met, the educator, to be sure, has recourse to the law to have them fulfilled. However, more often than not, it is probable that due to the highly competitive sales approach of engineer-salesmen to get the contract, the educator expected to receive "extras" that were not actually in the specifications. Thus, the importance of avoiding ambiguity in spelling out the specifications cannot be overemphasized.

Academic:

In this area many institutions run into serious problems where causes are difficult to pinpoint and define. If you are beset by a negative and uncooperative attitude on the part of faculty and students, it could be the result of failing somewhere in the planning stages. It thus becomes necessary to analyze where you went wrong and take the necessary steps to compensate for the oversight or error.

Ask yourself these questions:

1. Did you get the faculty and students involved in the commitment through participation in planning committees?

2. Were the instructors and students fully informed about the operation and effective utilization of the system?

3. Has the administration provided leadership and exercised its authority in the implementation of its commitment?

4. Have the teachers been provided with incentives such as released time, compensation, technical, production, and research assistance?

5. Has the curriculum been structured to provide time, means, and reason for students to use the system?

6. Is the system being used to achieve instructional objectives?

7. Has the full range of utilization the system provides been fully explored?

8. Does the system itself function satisfactorily for all concerned?

Although the answers seem to be inherent in these questions, knowledge gained from the experience of others will also be of value here.

As a rule, teachers are encouraged but not forced to make use of the new dial access system. This often leaves fairly large numbers of non-involved and peripherally interested teachers.

Getting teachers involved in the effort is, as we have repeatedly stated, a key to effective utilization of the dial system. Communication on the academic level will effect involvement. Let all instructors know what is being undertaken and accomplished through reports and published comments.

It's human nature to resist the untried and the unknown. But as those who are using the system meet with success, others will be attracted in increasing numbers to participate in the program. Providing faculty with production resources and technical expertise, which will insure their success in taping, will go a long way towards involving them as active participant-users of the system.

A stimulating exchange of ideas and materials for initiating and implementing programs in specific subject areas can be accomplished by setting up workshops or seminars to which you may invite curriculum experts. Teachers from other schools who have been successful in integrating use of the system with their method should also prove valuable participants in these workshops. Several prominent public schools in the country have already worked out an agreement for exchanging materials for use in their dial access systems.

Often too much is expected from instructors. If proper incentives have not been provided, it becomes difficult to evoke the desired faculty interest. Release time and summer compensation for development of materials and restructuring of courses have been found to be solutions to this problem. The institution will be immeasurably repaid through the increased efficiency of instructors and the more effective utilization of the dial system.

Administrative leadership and commitment are also important factors in the faculty's participation. If authority for the implementation of the system is siphoned off to an audio-visual specialist without the necessary administrative back-up and support, a successful operation is impaired, particularly if communication between the faculty and media man is less than exemplary.

It is necessary to make continual evaluation of the effectiveness of your staff utilization of the system if its effectiveness is to be increased and if the instructional objectives for which it was purchased are to be met. Evaluation of student performance and survey of instructor/student attitudes will often provide an insight into the strengths and weaknesses of the system's use.

Copyright Status

At this point the present copyright law, written in 1909, is in the process of being replaced by a new law. When the 91st Congress convenes in 1969, hearings will be held and a new effort made to get a new bill passed favorable to education. The users of information retrieval systems, including computers and remote access, have a very important stake in the way the new law will read, since the possibility of copyright payments for independent use of materials is a real financial threat as well as a burden administratively. The publishing houses argue that use by individual students may substitute for purchase of additional copies thereby jeopardizing financial renumeration to the author. Since the thrust and emphasis is more and more on individualized instruction, the implication of such a provision in the law is causing concern among educators. The prospects of an accommodation to education for restricted use of materials are favorable, but will require a determined effort by educators to make their views known to our federal legislators.

Summary

The success of any technology depends largely on the efficiency and effectiveness of its use. Dial access, with all its potential as an electronic distribution system, is no exception. The following represents a summary of the criteria for succeeding with a dial access system:

1. Administration/faculty involvement, participation, and commitment

   Planning committees should exist as long as there is a commitment. Commitment should be translated into adequate financing and faculty incentives, the purposes of which are to improve instruction.

2. Administrative leadership

   Key role is played by the person in charge of implementing program. He must have enthusiastic commitment with authority to insure program's success. Delegation of responsibility to media man may not provide proper communication with faculty or authority to get results.

3. Incentives for teachers

   Unreasonable to assume teachers can or wish to carry full load of teaching and prepare materials for the system. Provide extra compensation for summer work to develop programs. Give release time from teaching duties during school year. Provide funds for travel, research. Such incentives will well repay the institution in greater efficiency of the teacher.

4. Familiarity with system's operation

   Teachers must know how the system operates technically. Teachers must be oriented to effective use of the system. Teachers must be kept informed on progress of the program.

5. Assistance in selection and preparation of materials

   Ease and convenience of acquisition and preparation of materials increase faculty use. Provide assistance in making tapes, graphics, etc.

6. Latitude and control in selection of materials

   Give faculty as much latitude as possible in the selection and development of materials. Do not force materials or prepared courses upon them. Help the teacher acquire the materials he wants and needs. Provide support and encouragement to those teachers who view the system as a threat to their position. Seek out and make available short concept material that can be incorporated by the teacher into the main course content as opposed to entire programs.

7. Start initially with adequate program material.

8. Software seminars

   Hold practical workshops with staff, consultants, and colleagues from other institutions with similar systems. Support staff by providing encouragement and appreciation as they progress in the development and utilization of their program material.

9. Lead-time essential

   Avoid having hardware ready before software. Psychologically defeating to have new equipment around waiting to be used.

10. Need for expert technical consultant

    Determine educational needs prior to setting forth technical specifications.

11. The electronic equipment should serve the program

    The program should not be designed around the equipment. Too many systems are restricted by the equipment.

12. Design system to allow for expansion and future developments

    Program should grow in step-by-step manner as materials are developed and used. Software is the key to any successful operation.

13. Get competent local installer for equipment, with reputation for service.

14. Get adequate capital investment in space, equipment, supplies and software

    Software budget should include cost of all materials acquired or produced, teacher-time and incentive costs, production personnel, etc.

15. Quality equipment and installation will pay off in teacher and student acceptance of the system.

2

B. FOR TEACHERS

"The essence of education is beyond the capacity of the machine and always will be. It is the program designed by the teacher that teaches, not the machine. The outcome of educational technology will be to free the teacher from the robot role of standing in front of the classroom presenting routine material and recast his role to that of an intellectual stimulus and manager of learning." ("The Realities of the Learning Market," U. S. Commissioner of Education, Harold Howe, II.) Speech given before the American Management Association, August 9, 1966).

Dial Access -- A Tool Not a Panacea:

A dial access system offers the teacher an important working tool which could be the link to the desired goal of individualizing instruction. It has the significant advantage of bringing the whole range of audio and visual materials to the learner and teacher at the very time they are wanted and needed. It thus avoids the scheduling rigidities of instructional television and radio while placing their product at the disposal of the teacher. Further, it eliminates the inconvenience involved in operating projectors, recorders, and other equipment.

Human nature is prone to regard that which is not known as a threat, even though it may later prove to be a blessing. The introduction of technology into the classroom often evokes the fear that it will either replace the teacher or expose his teaching methods. This has not proved to be the case. Science and technology have and are serving other professions well. Education is today being challenged to improve the quality of its product -- student learning. Teachers must accept this challenge with open minds.

Faculty Involvement

The introduction of hardware into an instructional system poses many problems. For one thing, it sometimes seems to be a monster that has to be constantly fed. Unfortunately, there is at present a dearth of appropriate material. What is available has to be searched out, evaluated, and perhaps modified before being integrated into the curriculum. The main burden of this falls on the teacher. Since the development of this material is so crucial to the success of the program, it is obvious that the teacher be involved early in the planning of a dial access system.

Effective utilization of the equipment depends on a number of factors. These are rightfully the concerns of the teachers and should be given serious consideration while funds are being allocated for the hardware. The most important prerequisites to effective use by the teacher include:

> Incentives -- released time from regular teaching duties to produce materials, summer pay for program development, funds for travel and research.
>
> Orientation -- getting to know how the system works technically and how to use it most effectively, providing for necessary assistance, holding workshops to assess resources and exchange ideas, providing adequate preparation time prior to installation.

It is well to design, demand and lobby for a realistic program of funds and support that will meet your needs and assist you in achieving your instructional objectives. Otherwise, the hardware will suddenly appear and you will be expected to make use of it, under obvious handicaps.

Pre-Installation Planning for Effective Utilization

A practical approach to planning for the system's use is to obtain a tape recorder and start to develop some pilot audio materials. These could logically include lectures, segments of lessons, interviews, excerpts from educational television and radio programs, records, etc. Such material preparation will provide a "feel" for the media and an effective means of feedback for checking one's style, speed and clarity of presentation on tape. Further evaluation can come from trying out the taped material on selected students.

One of the more difficult tasks is searching out the available materials appropriate to one's curriculum. This takes a lot of research which deserves adequate advance planning. Too often, a hardware system arrives and then teachers start looking for materials -- which is like moving into a new house before you have begun to select or order the furnishings.

Sources of Materials

The amount of software produced and available is extensive, but there is no national bibliographic control to know the total output. Consequently, this makes the selection a confounding task. However, there are several sources (see Appendix for a more complete list with addresses) which can be considered representative of the varying types of software materials. These include:

Guides to Newer Educational Media:

Published by the American Library Association, this is perhaps the first attempt at a national bibliography of audio-visual software. It includes sources for 16mm motion pictures, 35mm filmstrips, 2" by 2" and 3-1/4 by 4" slides, kinescopes and videotapes, phonodiscs and phonotapes, transparencies, and programmed instruction materials. In addition it lists professional organizations and periodicals concerned with the newer media.

National Audio Tape Catalog:

This represents another attempt at national bibliographic control, but of audio tapes only. Tapes are selected on the basis of their relevancy to the curriculum and their quality of production.

Audio-Visual Source Directory:

A semi-annual publication of the Motion Picture Enterprises Publications, Inc., this directory lists manufacturers and producers of audio-visual hardware and software services and products.

The Great Plains Instructional Television Library:

This is probably the best source of instructional television lessons in the country. Their catalog of recorded television courses is available for distribution.

University Production Centers:

Some universities including Indiana, Illinois, Kent State, and San Jose State College, produce their own audio-visual materials, as well as modify off-the-shelf materials. These are available in most instances through inter-library loans and/or purchases.

Commercial Houses:

Films and filmstrips are available from such producers as the Encyclopedia Britannica, Coronet Films, McGraw-Hill, and Jam Handy. There appears to be no end to this list, but perhaps the best tool for keeping up-dated is Audio-Visual Instruction, published by the Department of Audio-Visual Instruction of the National Education Association. Each issue contains an index of reviews on audio-visual materials, citing the source.

Copyrights:

Congress is in the process of developing legislation to replace the present copyright law, written in 1909. Educators are rightfully concerned that its provisions should not inhibit the development of information retrieval systems, including computers and remote access, by imposing copyright payments for independent student use of audio-visual materials. This would logically mean that a charge would be involved everytime a student dialed in for material that was a copyright. The publishing houses contend that use by individual students substitutes for the purchase of copies in addition to the one used on the system. With the current trend in American education toward independent learning through individualized instruction, such a provision would pose a financial threat to this development. Although the prospects of an accommodation to education for restricted use of materials are favorable, educators should make their opinions known to their legislators.

With regard to teacher-produced material, the best way to be certain of your rights, as matters now stand, is to have an understanding spelled out in your contract. Generally, the school district or college will reserve rights on anything produced during your employment for use in the on-going curriculum. Little precedent has been set in this area and no general statement of practices can be formulated at present, other than the agreement just mentioned, preferably in writing, with your employers as to your rights on produced materials during your tenure, and after you leave.

Methods of Approach

In order to make effective use of a dial access system, it is recommended that:

(a) Course objectives be given additional thought and be restated for fullest use of audio-visual materials. In essence, this amounts to restructuring the course.

(b) Students' total time devoted to class lectures and assignments be programmed, thus breaking the rigidity of the in-class/out-of-class routine. For example, a teacher may want to put a classroom lecture on tape for assignment and then use that class hour for small group discussion meetings.

(c) Instructional variations be considered including:

- Various patterns of student contact
- Recorded lecture/exercise using a workbook
- Recorded resource material
- Recorded programmed material
- Single concept use -- integrating slides, films, filmstrips to supplement an audio-only system

(d) Response be integrated with audio retrieval.

In order for learning to be effective, a means for student response to the material should be provided. This avoids distractions and often boredom in passive listening or viewing.

(e) Length of viewing or listening be limited. Unless the material is kept relatively short (15-30 minutes), students become bored or lose interest. Workbooks requiring responses do increase attention and are generally motivating. Short single concept tapes or films and mini-documentaries (3-6 minutes) show great promise for use in the system.

(f) Adequate free time be available for student use of the system. This is why flexible scheduling in high schools is proving to be a boon for the installation of dial access systems.

Selected Instructional Applications:

There are a number of ways that a dial access system can be used within the curriculum. These will vary with the nature of the subject matter and courses. The following examples are some of the more common applications found in practice:

Enrichment and Supplementary:

- Listening to poetry read by a professional reader or author.
- Dramatization of plays or excerpts. Used effectively in drama and language courses, integrated on the tape by the teacher.
- Music -- to demonstrate styles with commentary; to familiarize the student with music of the Masters.
- Interviews with experts or persons knowledgeable in a subject area. (Ex. comparative religion: teacher interviews members of different faiths to tell of their religion.)
- Talks, lectures, speeches by authorities and scholars in their field.
- Lectures normally presented in classroom. Use of systems by teacher to increase available time for other activity such as small group discussion.

- Laboratory orientation -- by having instructions and information on tape, students are able to use lab at their convenience. Instructors are freed to use their time more productively. In addition, instructions can be accessed while student is actually working on an experiment or viewing material through a microscope.
- Required proficiency level -- for bringing students up to certain knowledge level for entry into advanced course or grade.
- Dictation -- for secretarial instruction.
- Drills -- language, speech, etc.
- Current events -- recording excerpts from television and radio broadcasts for discussion.
- Historical dramatizations.
- Instructional presentations and concepts.
- Demonstrations -- particularly in science (on film or video tape).
- Documentaries.
- Orientation -- school information, scheduling, announcements, etc.

Review of Content Presentation (Lectures, etc.):

- Important reinforcement to student, particularly slow ones who have trouble absorbing information. Assists all in acquiring more complete notes for review.
- Make-up for students, absent for one reason or other.

Remedial:

- Recorded lectures that the student can listen to until he fully understands the material.
- Tapes that may present the same content, but from a different point of view.
- Tapes that simplify the presentation with easier vocabulary and where practical, more visuals.
- Recorded material that may contain different content for those who are not ready for the standard course material.

Major Content Presentation:

- This use of dial access mostly found with language courses.
- One professor found a suitable course to put completely on tape (video) with periodic examinations.
- Orientation material -- use of the library and other school facilities, curriculum, degree requirements, college guidance, etc.
- In-service teacher programs.

One well-informed teacher reflected a common point of view on use of the system by stating: "I think we've just begun to scratch the surface here in utilization. I am convinced there are many more imaginative ways that it can be used than are being utilized now, and I think we are going to come up with them."

C. FOR LIBRARIANS

During the planning stages of a dial access system, provision should be made to orient teachers in selecting software and in producing their own tapes, slides, films, or transparencies. The librarian is the key person to assist teachers in their selection of materials. This presupposes the librarian knowing, first of all, the available sources of off-the-shelf software and assembling this information in a systematic, accessible form. Most teachers have neither the time nor the inclination to search out software sources. Consequently, much valuable and reliable material is unknowingly passed over and mediocre material used instead.

To organize and maintain a suitable file of audio-visual software materials, the librarian must draw from all sources, namely commercial distributors' and producers' catalogs, university catalogs, private organizations, and community agencies such as the public library, departments of government, and free loan distributors. After appropriate source materials are assembled, a system of classifying them into types, subject matter and grade levels must be devised, and a suitable updated and annotated bibliography made available to faculty members. The ideal procedure is for teachers to preview all the material included in the bibliography; lacking this, an evaluation file should be kept. Teachers who use the materials should also contribute to this file. On the basis of this evaluation, duplicate materials can be purchased. An extensive knowledge of the curriculum, therefore, is indispensable for librarians. Of course, selections are also conditioned by available budget, time, and manpower.

The present number of dial access systems in operation are mostly audio but the greater amount of educational software produced is visual. Consequently, audio tapes must be largely teacher-produced. Also, much "off-the-shelf" material is not suitable or appropriate to every school situation, and requires adaptations and modifications to meet specific objectives of one's own curriculum. Thus, an educationally effective dial access system demands a continuous effort to acquire, produce, or adapt audio-visual software as an essential part of its operation.

Some suggestions on sources of software materials are presented here. (A more extensive reference list with addresses is to be found in the Appendix.) No attempt is made to evaluate the sources but descriptions are given. Individual decisions must be made on the basis of the educational needs that exist and on the objectives that prevail in your own school situation.

General

The first attempt in the direction of a national bibliography of audio-visual materials is the Guide to Newer Educational Media published by the American Library Association. It is a kind of "bibliography of bibliographies," published as part of an extended study to ascertain a possible system of bibliographic control of the sources for 16mm motion pictures, 35mm filmstrips, slides, kinescopes, video tapes, records, audio tapes, and transparencies on various subjects at all grade levels.

The Government Printing Office, Washington, D.C., has produced a parallel publication, titled Sources of Audio-Visual Materials.

The 14 volume Educational Media Index, the result of a project by the Educational Media Council in 1964, is a national compilation of instructional resources, excluding printed materials. A popular reference source, the Index includes only materials educational in nature and available for educational use in the United States.

Tapes:

In the field of audio tapes, the Department of Audio-Visual Instruction of the National Education Association the National Association of Educational Broadcasters, and the National Center for Audio Tapes of the University of Colorado, sponsored the preparation of the National Audio Tape Catalog. The tapes listed were rated on the basis of their relevancy to the curriculum and of their quality of production. About 130 organizations, associations, universities, broadcasters, and industries are represented in the selections.

Learning Machines, Inc. publishes an annotated list of 300 audio tapes produced and sold by LMI. The tapes are produced on 5" reels or cartridges and range from first grade to adult level materials in a variety of subjects.

The Beverly Hills Unified School District publishes a partially annotated list of audio tapes used within their own system, and along with Oak Park-River Forest, Illinois, West Hartford, Connecticut, and Pittsburgh school systems are participating in a study under USOE grant to Evanston Township High School (Illinois), "to develop independent study materials in the areas of film, video tape, audio tape, and slides, and for the exchange of such material on a national level . . ." (The Annual Report, ETHS, 1967.)

Wollensak publishes a catalog of teaching tapes available in four major areas of the curriculum: mathematics, social studies, language arts, and science. Included with each tape is a teacher's guide and a complete set of library catalog cards.

Audio motivated skill-tapes are available from Charles Merrill Books on grade levels three to senior high. The material is essentially supplementary.

Educational Development Laboratories produced 34 taped lessons on the "Listen and Read" series in 1961, designed for junior and senior high school students, to improve listening and reading skills.

Amidon Associates offers a variety of recorded learning materials with coordinated student guide and question books. Each tape also comes with a teacher guide that includes follow-up activities.

Imperial Productions, Inc. has complete sets of tapes covering units in science, language arts, reading, history, English and modern foreign languages.

Scholastic Teacher magazine has developed an evaluating-reviewing service of all types of educational materials. Their catalog, New Educational Materials, evaluates audio-visual materials from K to 12 in language arts, social studies, science, art, music, health and safety, sports, and games.

Records:

One of the largest and most comprehensive library of songs, sounds, and literature from around the world, is Folkways Scholastic Records. The catalog lists records from preschool to adult years, covering music, science, social studies, English, speech language skills, literature, foreign languages, and peoples of the world.

Caedmon is another good label to check for source material.

Educational Record Sales publishes a catalog of phonograph records arranged according to grades and subject areas. Most of the listings are the product of RCA Victor and Columbia.

Spoken Arts, Inc. produces LP recordings and prerecorded tapes in the areas of language arts, modern languages, history and the humanities from the elementary to the adult level.

Television:

The Great Plains Television Library now supplies many taped television lessons found in ITV and produced and used by major non-profit educational institutions. The programs range from elementary to adult level and cover the fine arts, foreign languages, geography, language arts, mathematics, physical education, and science. Distribution of the recorded courses is through duplicate video tape recordings made from duplication masters held at the Great Plains Instructional TV Library.

Instructional TV materials on both film and video tape can be obtained from the Center for Instructional Television, from Midwest Programs on Airborne Television Instruction, and from the National Center for Schools and College Television. Other sources include an increasing number of state education departments and city school systems. Off-the-air recordings of programs ought not be overlooked, but written permission should be requested of the originating station.

Films and Filmstrips:

Films, filmstrips, and overhead transparencies for use in pre-school through college levels, can be purchased from Encyclopedia Britannica Educational Corporation.

Their materials are classified by curriculum subjects within broad grade levels. A ten-day approval period is also allowed for examination of materials prior to purchase.

The Audio Visual Source Directory is a semi-annual publication of Motion Picture Enterprises Publications, Inc., and lists manufacturers and producers of A/V hardware, and software services and products.

Coronet Films produces films and filmstrips on all grade levels and in all major subject areas. Their filmstrips have silent captions for those who prefer them or sound for added depth and meaning.

Films and filmstrips for elementary grades, junior and senior high schools, and colleges are available at McGraw Hill covering all subject areas and accompanied by teacher's guides or instructor's manuals. A rental-ownership plan can be arranged for prospective buyers. Many of the films have been carefully planned to accompany a specific McGraw Hill textbook.

DuKane Corporation publishes an Audio Visual Source Directory of educational sound filmstrips with a summary of each and a list of film producers and distributors. In addition, it lists business, industry, government, and other agencies that provide free loan educational filmstrips.

Full color filmstrips for elementary grades can be purchased from Audio/Visual Division, Popular Science Publishing Company. They treat subjects such as history, geography, government, and economics. Special emphasis is given to development of concepts and attitudes concerning America and the world.

Jim Handy Organization produces many filmstrips and 16 and 8mm films for the major subject areas and grade levels of elementary and secondary schools.

In addition to sources of software listed above, whose addresses are to be found in Appendix C, materials can be obtained through loan or purchase from universities. Among these are: San Jose State College, University of California at Berkeley, Colorado State College, University of Minnesota, Ohio State University, Penn State University, Indiana State University, University of Illinois, and Kent State University.

Miscellaneous References:

Educational periodicals, such as Audio-visual Instruction and Educational Screen and AV Guide, provide sources of identifying and locating materials, with descriptions and evaluations of what is current. They also periodically list distributors and producers.

Organizations such as the American Library Association, the National Association of Educational Broadcasters, and the Department of Educational Technology of the National Education Association, are other good sources of information in your search for appropriate materials.

Many fine sources for local, live production exist within each community. These include museums, historical sites, government, colleges, universities, performing arts centers, and business and industrial establishments. A librarian's knowledge of the community resources can be a valuable aid to the teacher in the preparation of material.

Conclusions

Dial Access Retrieval is but one of many technological agents that is inciting change in our school libraries. Whereas librarians previously dealt strictly with book materials, they must now assume responsibility for all types of print and non-print instructional materials, selecting, cataloging, classifying, and making them available for retrieval. In addition, faculty members are beginning to look to the librarian as the person most qualified and competent to assist them in acquiring the most suitable materials for their presentations and assignments, in keeping them advised on what is new, and in providing a quick reference source for available materials in their subject area when needed.

TECHNICAL PERSONNEL

Specifying Equipment and System Requirements

Major factors affecting the determination of the dial access equipment needed are system specifications and the amount of financing available. The equipment is intended to serve as a tool, enabling the student to access and utilize instructional materials, at his convenience. But, the finances available may impose a number of restrictions and limitations which are at odds with the educational specifications.

As always, compromises have to be made. Costs must be kept at a reasonable level, but experience has shown that the least expensive system may offer less than satisfactory performance, indicating that the purchase of more expensive equipment can actually be an economy.

To illustrate how the many factors come into play, decisions relating to the master audio tape units will be considered. Perhaps, the first decision will concern the number of programs that are to be recorded on the same tape (often referred to as the number of tracks). Current systems have 1, 2, 3 and 4 tracks on 1/4" tape, and 32 tracks on 1" tape. Apart from the 32 track system, the decision to utilize a specific number of tracks might be based on the answers to questions such as:

(a) Do we want to give the teacher maximum flexibility in having tapes put on or taken off the system? If so, we should use 1-track tape.

(b) Can we afford to have more than one program on the same tape, either because both will be needed at about the same time or because they are otherwise conveniently related to each other? If so, we should save space and equipment and have more than one program per tape.

(c) If there is to be more than 1 program (or track), can we arrange the programs to be about the same length, thus avoiding "dead-time" on one track while the other(s) are being utilized? If so, multi-track recording would be all right.

(d) Is it necessary for students to start at the beginning of the tape, or can they join in once the program is in progress? If the answer is that they must start at the beginning, then there are two choices: (1) have the program start at fixed times and permit no one to dial into the program once it has started, or (2) purchase a "random access" system such as that at Oak Park, Illinois, which provides each student his own program by taping from a master copy to blank tape at high speed.

(e) What will be the maximum program length? Will we aim at 15 minute programs, or will they vary from one teacher or subject to another? The answer to this question will determine whether you can use a fixed-length tape cartridge system, or the maximum reel size the system can accommodate.

At the present time, there is no clear evidence that the quality of sound is degraded by placing more than one program on a tape. And, the cost of a four-track tape unit is not much greater than the cost of a single-track unit.

To assist in making a decision about the number of tracks to be employed, the advantages and disadvantages of the single-track system are given below:

Single Track Tape System

Advantages	Disadvantages
1. Maximum flexibility with regard to placement on or removal of the tape from the dial system.	1. One machine is required.
2. The program can be placed on tape without worrying about matching the length to other programs on the same tape.	2. More space is required for tape storage.
3. The playing of the program	3. The number of programs

Advantages	Disadvantages
can be scheduled without interfering with the normal operation of the other programs.	available at any one time is the same as the number of machines.
4. Damage to the tape affects only one program.	4. Higher tape costs since more tapes are needed.

These are a few of the considerations that will influence the choice of the master audio-tape unit. It is easy to imagine that a great deal of time can be spent in reaching a final decision, and this is indeed what happens in practice. Experience with operating systems has shown that seemingly unimportant considerations become major concerns when dealing with large systems. Thus, it is important that sufficient time be spent in exploring all aspects of a dial access system and its relationship to satisfying the educational objectives. The advice of experienced system operators should be solicited during this investigation.

We have considered the master audio-tape source in some detail, so as to illustrate the types of decisions that need to be reached. A series of questions is presented below which touch on many different aspects of the system. They are presented as guides, with the anticipation that many of them will not be answered until the system design is well under way, and consultants are available to provide assistance and advice.

Questions Leading to System Specifications

a. Audio Sources:

1. Do you want master tape units with 1, 2, 3, 4 or 32 tracks?

2. Do you want student controlled units to be remotely located or in carrels?

3. What degree of student control do you wish to include? Stop, start, rewind, fast forward, record, playback, pause, compare?

4. Would you like each student to be able to obtain his own copy of the tape?

5. Would you like to limit program access to those having certain qualifications?

6. What would you consider to be the maximum program length? (This answer will affect the size reel you employ and/or the tape speed and/or the tape you will use.)

7. Do you have any demands on the length of time it will take for the tape to rewind after completing the program?

8. How many student stations should the system be able to send programs to simultaneously without any noticeable effect on the volume level?

b. Audio Switching Equipment:

1. Are you committed to any particular type of switching mechanism, e.g., solid state, electromechanical crossbar, rotary steppers, etc? (Each has its advantages, and all are currently in use.)

2. How many access lines will you want? (This will usually be equal to the number of student-receiving stations.)

3. How many audio programs should be available simultaneously?

4. Will you want to run balanced lines through the switching equipment? (This requires twice as many switching elements and keeps both signal wires above ground potential but has questionable value in keeping interference from the audio program. Some installations pass an unbalanced program through the switching unit; then, via a matching transformer, send it to the student position over balanced lines, thus achieving sufficient protection from unwanted signals and interference.)

5. Will you accept a standard switching unit with a greater capacity than you initially require in the interest of possible future

expansion?

6. Can students enter into the program after it has begun. If not, would you simply present them with a busy signal or would you try to give them some indication of how long they will have to wait before the program begins again? Or would you simply operate the program according to a predetermined, published schedule?

7. Would you like to build into the system the capability of permitting the student to go directly to a particular portion of the tape? (This is referred to as automatic queing of the tape segment.)

8. What is the maximum length of time you will permit to elapse between the initiation of the student's request and the presentation of the program material to him? (This assumes that he is qualified to receive the program and that the program is available.)

9. When the students have stopped listening, but the program has not ended, do you want the tape to stop and rewind? (Machine wear must be weighed against the probability that more students would dial into the beginning of the program.)

c. Video Program Sources:

1. How many video sources do you want to feed into the system? (These include video tape recorders (VTR's), movie projectors (8mm or 16mm), filmstrip projectors, slide projectors, TV cameras, microscope TV cameras, video programs obtained off-the-air from commercial TV, ETV, Instructional Television Fixed Service (ITFS - 2500 MHz).

2. Recognizing the complexity of video sources, do you want to provide student control over the video tape recorders? Or will your needs be met using scheduled programs? Or will you compromise by having the students dial in to start the program but have no further control?

3. Do you want a full-fledged closed circuit TV

system to be operable through the dial access system?

4. Do you presently have a video tape library? If so, do you need to have a video tape unit that will play these tapes through the remote access system?

d. Video Switching:

1. Are you committed to any particular type of switching mechanism?

2. How many access lines will you want?

3. How many input lines do you want to provide for, considering possible future expansion?

4. Are you willing to accept a standard unit even if its capacity is greater than you need?

5. Can students enter into the program after it has begun? If not, would you simply present them with a busy signal or would you try to give them some indication of how long they will have to wait before the program begins again? Or would you simply operate the program according to a predetermined, published schedule?

6. Would you like to build into the system the capability of permitting the student (necessarily the first student to dial into it) to go directly to a particular point in the program?

7. What is the maximum length of time you will permit to elapse between the initiation of the student's request and the presentation of the program material to him?

8. When the students have stopped viewing but the program has not ended, do you want the tape to stop and rewind?

e. The Carrels or Dialing Stations:

1. How large would you like the carrel to be?

2. How large should the video monitor be?

3. Should the video monitor have student adjustments?

4. Should the video monitor be mounted flush, directly in front of the student or in the corner of the carrel in caddy-corner fashion?

5. How many dialing stations should there be in the classrooms? How many video monitors?

6. With how many sets of earphones should each classroom be supplied, and how should the students connect them into the system?

7. Do you have any preference as to the type of device used to request the program? Only a very few types provide you with a continual indication of the number of the program you selected. How important is this to you?

8. How do you want the student to proceed when dialing into and out of a program? Should it be necessary for him to "dial out"? Should there be some sort of light to indicate when that station is "dialed in"? Would it be better to "dial in" or "dial out" by using a simple toggle switch rather than a dial?

9. Should you spend the extra money to go to a "touch-tone" selection device? This offers many advantages including the ability to process multiple choice answers for programmed instruction materials.

10. What quality microphone and/or headset should you purchase?

11. What measures can you take to make the system tamper-proof or, as sometimes stated, student-proof? This would include such things as continual-rotation volume controls, special screwheads, flush indicator lights, subsurface control mounting, deface-resistant carrel materials, etc. The obvious weak link is going to be the headsets, and no one

has yet come up with a good solution. Could you have each student check out a headset for the semester? No one now does this since there are obvious difficulties. But there is quite a turnover in headsets in spite of attempted monitoring procedures.

12. Should there be a tape-position indicator so that the student can know how far into the program he is?

13. How should the communication between the system control room and the carrel location be arranged? Should each carrel have an intercom capacity to call directly or should "trouble" phones be located in close proximity to the carrel?

14. How and where should clusters of carrels be arranged? Environment of the carrel and space efficiency are important considerations.

15. What provision should you make to provide the student something other than beige painted surface to stare at during the audio-only programs? When asked what they did while listening to programs, students' replies varied from writing in notebooks and workbooks to staring at the walls or doodling on the desk-top. There seems to be no clear evidence, however, to indicate that learning is being hindered by the bareness of the carrel walls.

16. Do you want to make provision for the students to tape dialed programs onto their own recorders? If so, additional phone-jacks will have to be included in the carrel.

17. Do you want the booth construction material to be sound absorbent as well as mark-resistant? Along this line, it is advisable to have points of maximum wear such as booth edges, made of a material that does not need to be painted (chrome, for example).

Six charts of technical specifications located in the Appendix show the types of equipment available from the major manufacturers of remote access equipment. Since many of the specifications are of a technical nature, a qualified person should be called upon to assist in interpreting them. Additional information or clarification is available, of course, from the manufacturers. They are listed in the Appendix also, with addresses and names of persons to contact.

Monitoring, Testing and Record Keeping

In this section, consideration is given to one of the most neglected aspects of remote access systems: that of keeping track of what goes on during the utilization of the system. The study conducted by the Catholic University revealed that only three institutions were carrying out any sort of methodical research activities, and two of those were straightforward language laboratories. There is a great need for detailed studies of the effectiveness of remote access systems. Such studies can be greatly facilitated by incorporating certain features into the original design, which should be relatively inexpensive, particularly when compared with the over-all system. The results can be beneficial to the institution's administration as well as to the teachers and students, and will be manifested in terms of greater knowledge of who is using the system and why, how frequently it is being used, how long it is being used, by whom and from which student locations.

At the present time most small systems do not provide any means whatever for keeping track of system utilization. Some of the larger systems do, but even these are often limited to merely counting the number of calls received from the various receiving locations and the number of times the program is dialed. Much more is needed if instructional materials are to be evaluated, some idea of student effort obtained, and system expansion intelligently forecasted. To these ends, then, the following procedures and provisions are suggested:

1. Traffic density studies for all programs placed on the system. This includes the number of calls made for each program, the time and date and duration of each call. From these figures, which involve only time clocks, counters and a recording mechanism, many calculations can be made which will have a bearing on any estimates of learning effectiveness, student acceptance.

2. Traffic density studies for all receiving stations, including classroom stations. The same procedure would be used as when conducting program density studies, and from the data should come estimates on the desirability of having carrels in particular locations, indications of the need to add or remove carrels in certain areas, projected preventive maintenance scheduling, etc.

3. If attempts are being made to utilize programmed instructional materials, additional record keeping may be necessary. If a push-button select system is used, multiple choice answers can be processed, and the effectiveness of the programs validated by keeping records of the students' frequency of correct response, length of time for each frame or sequence of frames, identity of student, etc. These procedures are presently ahead of the state of the art, but should be planned for by institutions with the means to conduct such studies.

4. Computers can obviously play an important role in the reduction of the data ensuing from the procedures outlined above. Hence the potential tie-in between the computer and the dial access system should not be overlooked. Modified computers are now playing an important role in the reduction of the total amount of space needed to carry out switching operations. They do this by removing the necessity for dialed pulses from the receiving stations to actuate stepping relays, as in a conventional telephone exchange network. Rather, they interpret the series of pulses and, at the conclusion of the dialing, issue a single command to the switching matrix and establish all the needed connections at once. The results are not only a saving in the total number of components in the switching mechanisms, but also a reduction in the time to establish a single connection. Because of this reduction in connection time, and for other reasons, the number of requests for programs that can be satisfied within a given length of time can be much greater. A word of caution is necessary, however. At the present time, the computer is the most delicate and least re-

> liable component of the system. And, its failure usually disrupts the entire system until a manual type of operation can be put into effect.

Monitoring and Testing are important capabilities that should be built into the system. Provision should be made for a technician to monitor any program as it emanates from the program source, after it is amplified, after it has gone through the switching matrix, and as it enters the lines to the student receiving station. Thus, when a student calls in because he is having trouble receiving a program, or just for routine checking or maintenance, the technician has the means to quickly locate the source of difficulty. In short, it aids troubleshooting and maintenance.

It may also be advisable to incorporate a display panel which would give a "present use" picture of the system. This can be conveniently done, and is being done, through the use of a light panel with each receiving station or monitoring station having its own indicator light. However, this has little long-term value since no hard copy of the system usage is provided, but it does give visitors and casual observers a good idea of the system usage while observing its operation.

III. APPENDICES

APPENDIX A

Operational Systems in the United States

The following dial access installations are ones identified through the State of the Art Study. The name of the person who can be contacted about dial access at each site is given, if that information is available. Installations marked with an asterisk are using dial access mainly or exclusively for foreign language studies. Those with a + have video capability.

Alabama

* University of South Alabama, Mobile

V. Gordon Moulton

Arkansas

+ University of Arkansas, Fayetteville

Dr. David W. Mullins

California

Bakersfield College, Bakersfield

Dr. Edward Simonsen

+ Beverly Hills Unified School District, Beverly Hills

Dan M. Gibson

California State College at Hayward

Dr. Arthur Kimmel

Chabot College, Hayward

Don Donatelli

College of the Sequoias, Visalia

Henry M. Grumbling

Gavilan College, Gilroy

Dr. Ralph Schroder

+ Grossmont College, El Cajon

T. A. Hepp

Laney Junior College, Oakland

Mr. Pettas

Los Angeles Valley College, Van Nuys

Marysville Joint Unified School District, Marysville

Leonard E. Larson

San Jose City College, San Jose

Robert I. Nelson

+* University of California, Santa Barbara

Dr. Joseph Sayovitz

Colorado

Alameda Senior High School, Denver

M. Horning

Trinidad State Junior College, Trinidad

Charles D. Latunda

Southern Colorado State College, Pueblo

Gerald F. Caduff

Connecticut

Central Connecticut State College, New Britain

Joseph R. Dunn, Jr.

* Connecticut College for Women, New London

Warrine Eastburn

Kent School, Kent

Dwight Tracy

* Manchester High School, Manchester

William H. Curtis

Mitchell College, New London

Dr. Robert C. Weller, Jr.

Simsbury High School, Simsbury

Robert H. Lindauer

University of Connecticut at Stamford

Robert H. Wyllie

University of Connecticut, Storrs

Dr. Carlton W. H. Erickson

University of Hartford, Hartford

Klaus Fischer

Wesleyan University, Middletown

Edgar F. Beckham

+ West Hartford Public Schools, West Hartford

Dr. Ira Singer

* Westminster School, Simsbury

Bruce Burdett

Yale University, New Haven

Mrs. Ruth Ann Yager

Delaware

Alexis I. DuPont Special School District, Greenville

Dr. Thomas W. Howie

District of Columbia

American University

Dr. Roger Penn

Florida

Brevard Jr. College, Cocoa

Dr. Leo C. Muller

+* Florida Atlantic University, Boca Raton

Dr. Juan Estarellas

Florida State University, Tallahassee

Dr. John E. Champion

Miami-Dade Junior College, Miami

Franklin Bouwsma

+ Nova High School, Ft. Lauderdale

Stewart Symnestvedt

Hawaii

Punahou School, Honolulu

D. H. Hansen

Illinois

* Aurora College, Aurora

H. Trumbo

* Carbondale Community High School Dist. 165, Carbondale

O. K. Bowen

DeKalb Senior High School, DeKalb

Marvin L. Berge

De Paul University, Chicago

David C. Scribner

* Eastern Illinois University, Charleston

Bruce E. Weier

+ Evanston Township High School, Evanston

Jeremiah F. Madden

George Williams College, Downers Grove

Dr. Richard E. Hamlin

Gibault Catholic High School, Waterloo

Rev. Edwin Hustedde

Hall High School, Spring Valley

V. Bingman

Hinsdale High School (South), Clarendon Hills

L. D. Murray

* Illinois Wesleyan University, Bloomington

Dr. Lloyd M. Bertholf

Lake Forest High School, Lake Forest

R. Metcalf

Oak Park and River Forest High School, Oak Park

Ted Johnson

* Olivet Nazarene College, Kankakee

S. D. Beeman

Sauk Valley College, Dixon

Loren H. Allen

Shimer College, Mt. Carroll

Dr. F. Joseph Mullin

Southern Illinois University, Carbondale

Thomas B. Turner

West Leyden Community High School, Northlake

George R. Cox

West View Junior High School, Romeoville

Audiovisual Service

Iowa

* Drake University, College of Education,
Des Moines

Donald K. Moon

Kentucky

Berea College, Berea

Audiovisual Service

Murray State University, Murray

William R. Mofield

Western Kentucky University, Bowling Green

Earl Wassom

Maine

* Hebron Academy, Hebron

Claude L. Allen, Jr.

Nasson College, Springvale

Gilles E. Auger

Maryland

Galway Elementary School (Montgomery County), Silver Spring

John Rouleau

+ University of Maryland, College of Education, College Park

Dr. Desmond Wedberg

Massachusetts

* Berkshire School, Sheffield

Thomas H. Dixon

* Brookline Public Schools, Brookline

D. W. Wheetley

* Clark University, Worcester

Dwight E. Lee

Eagle Brook School, Deerfield

C. T. Chase, Jr.

Fisher Junior College, Boston

Dr. Sanford L. Fisher

* Groton School, Groton

John Crocker

Mohawk Trail Regional School District, Shelburne Falls

Superintendent of Schools

+ Northeastern University, Boston

James E. Gilbert

* North Shore Community College, Beverly

Norman R. Coté

* State College at Worcester

William D. Joyce

Michigan

East Detroit High School, East Detroit

Richard Gess

Grand Valley State College, Allendale

Dr. George T. Potter

+ Macomb County Community College, Warren

Dennis Jaroh

* University of Michigan, Ann Arbor

Dr. Geary Rummler

Wayne State University, Detroit

Jerry L. Kirks

* Western Michigan University, Kalamazoo

Leonard Gernant

Minnesota

* Macalester College, St. Paul

Dr. Walter D. Mink

Southwest Minnesota State College, Marshall

Dr. Joseph P. Rossillon

Mississippi

Hinds Junior College, Raymond

Floyd S. Elkins

Missouri

Junior College District of St. Louis, Clayton
Dr. Robert C. Jones
Three Campuses:
Florissant Valley Campus, Ferguson

Miss Betty Duvall

Forest Park Campus, St. Louis

Howard Simmons

Meramec Community College, Kirkwood

Walter E. Hunter

Missouri Southern College, Joplin

Dr. Leon C. Billingsly

Montana

+ Eastern Montana College, Billings

L. Douglas Nixon

Inverness Public School, Inverness

W. J. Hoppes

Nebraska

+ Omaha Public Schools, Omaha

Craig K. Fullerton

Nevada

Clark County School District, Las Vegas

John R. Morgan

University of Nevada, Reno

Dr. Donald G. Potter

New Hampshire

Timberlane Regional School District, Plaistow

Neal A. Wiggin

New Jersey

* Centenary College for Women, Hackettstown

Ernest R. Dalton

* Leonia Public Schools, Leonia

Stephen B. Sims

Middlesex County College, Edison

Vernon Wanty

Ocean County Community College, Toms River

Howard Richmond

* Ridgewood High School, Ridgewood

Lloyd Ashby

* Rumson-Fair Haven Regional High School, Rumson

Joseph Kemprecos

* Vineland Senior High School, Vineland

+ Willingboro Public School District, Willingboro

John Rosser

New York

+ Bedford Public Schools (Fox Lane Middle School), Bedford

Robert Taylor

+ Burnt Hills-Ballston Lake Central Schools, Scotia

Mary Joan Egan

Byram Hills High School, Armonk

Clarence M. Urso

Clarkstown Central School District #1, New City

F. V. Festa

Emma Willard School, Troy

Dr. William M. Dietel

Fulton Montgomery Community College, Johnstown

Dr. W. L. Gragg

Ithaca College, Ithaca

Dr. Anthony Taras

Jefferson Community College, Watertown

John P. McGrath

Saratoga Springs City School District,
Saratoga Springs

R. B. Cooke

South Huntington Schools, Huntington Station

Joseph J. Del Rosso

State University College, Brockport

Jack B. Frank

State University College, Geneseo

Clarence O. Bergeson

State University College, New Paltz

Dr. John F. Price

* State University College, Oswego

J. Richard Pfund

St. Lawrence University, Canton

Francis E. Almstead

Ulster County Community College, Stone Ridge

Dr. Dale Lake

North Carolina

* Chowan College, Murfreesboro

Dr. Bruce E. Whitaker

Sandbills Community College, Southern Pines

Carl A. Long

St. Andrews Presbyterian College, Laurenburg

Stanley Baran

* University of North Carolina, Chapel Hill

Dr. Anthony G. LoRe

University of North Carolina, Charlotte

Dr. Larry G. Owen

Ohio

Central State University, Wilberforce

Francis A. Thomas

* Defiance College, Defiance

Dr. W. Noel Johnston

* Lorain County Community College, Elyria

Dr. Louis N. Theodosian

+ Ohio State University, Columbus

Dr. Paul Pimsleur

Oklahoma

Oklahoma Christian College, Oklahoma City

Dr. R. Stafford North

+ Oral Roberts University, Tulsa

William Jernigan

Oregon

University of Portland, Portland

Dr. Joseph L. Powers

Pennsylvania

Abington School District, Abington

U. Frank Rago

Bethlehem Area School District, Bethlehem

William J. Kadoich

+ Bucknell University, Lewisburg

Hugh F. McKeegan

Marywood College, Scranton

Sister M. Gilmary

+ Millersville State College, Millersville

Dr. V. A. Champa

Northampton County Area Community College, Bethlehem

Alfredo G. de Los Santos, Jr.

Pennsylvania State University, University Park

Francis M. Dwyer

Shippensburg State College, Shippensburg

Dr. Anthony J. Miklauson

Temple University, Philadelphia

R. Robb Taylor

Rhode Island

+ Providence College, Providence

Rev. Francis C. Duffy, O. P.

South Carolina

* University of South Carolina, Columbia

William J. Eccles

Tennessee

+ Kingsport City School System, Kingsport

Fred L. McCune

Texas

El Centro College, Dallas

Dick Smith

Utah

Brigham Young University, Provo

Darrel J. Monson

+ University of Utah, Salt Lake City

Dail Ogden

Vermont

* Bennington College, Bennington

Edith Stewart

Virginia

Arlington County Public Schools, Arlington

William P. Young

+ Marymount College of Virginia, Arlington

Mother M. Majella

Virginia State College, Norfolk

Jack B. Krail

Virginia Union University, Richmond

Dr. Thomas H. Henderson

Washington

+ Interlake High School, Bellevue

Audiovisual Services

* Moses Lake Senior High School, Moses Lake

Delbert Milholland

University of Washington, Seattle

Dr. George C. Buck

West Virginia

West Virginia Wesleyan College, Buckhannon

Dr. Walter L. Brown

Wisconsin

Madison Public Schools, Madison

Alfred Colucci

Viterbo College, LaCrosse

Sister M. Justille

University of Wisconsin, School of Medicine,
Madison

Dr. Thomas C. Meyer

* Wisconsin State University at LaCrosse

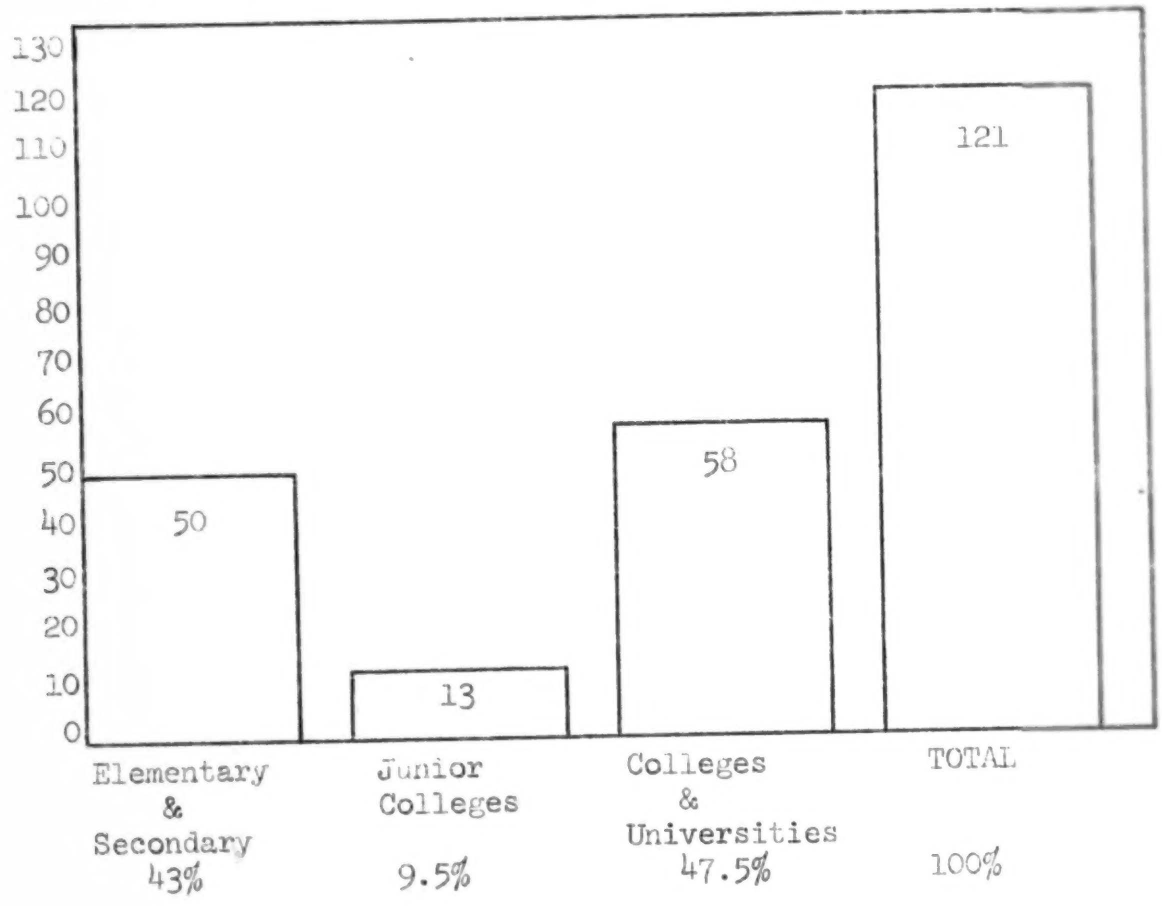
Dr. Samuel G. Gates

APPENDIX B

QUESTIONNAIRE DATA AND ANALYSIS

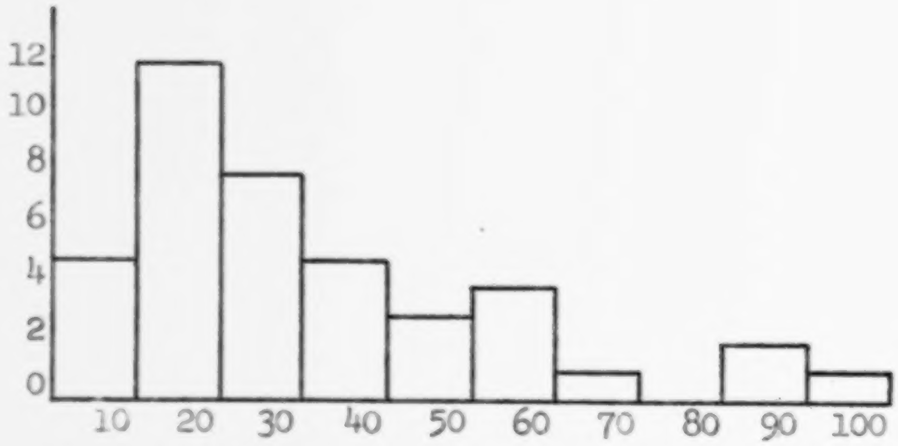
The State of the Art study conducted by the Center for Educational Technology at The Catholic University of America verified (as of March 31, 1968) the existence of 121 operational Dial Access systems in the United States. Almost 50 percent of these systems are operating in colleges and universities, while 43 percent are at the elementary and secondary level, and nearly 10 percent are in junior colleges. These numbers include language laboratories with dial access at all three levels. (See Figure 1b below.)

Figure 1b: NUMBER OF INSTITUTIONS ON DIFFERENT ACADEMIC LEVELS REPORTING OPERATIONAL DIAL ACCESS SYSTEMS.

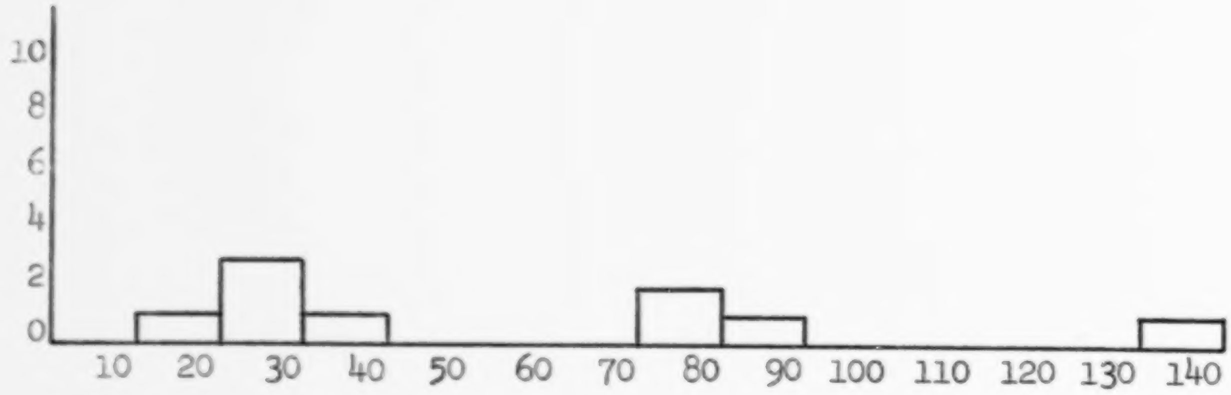


All institutions did not respond to every question on the questionnaires. Thus, analysis is based upon data received.

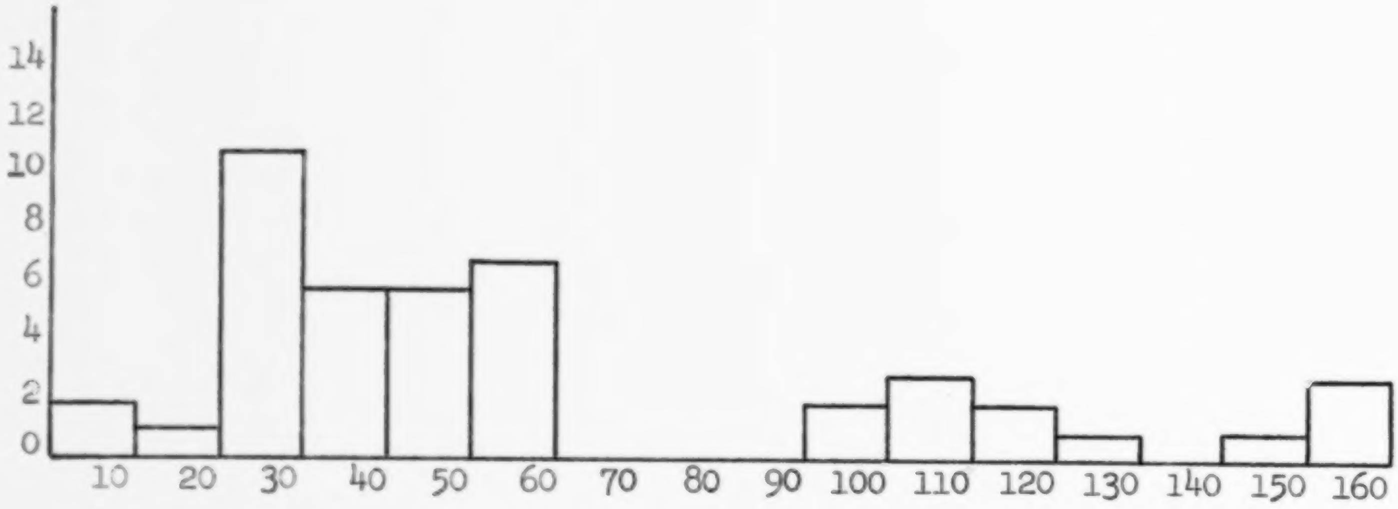
Figure 2b: NUMBER OF AUDIO RECEIVING STATIONS REPORTED BY INSTITUTIONS WITH DIAL ACCESS SYSTEMS.



Elementary & Secondary Schools Median: 25



Junior Colleges Median: 35



Colleges & Universities Median: 45

The number of audio receiving stations in each institution ranged from 6 to 857. The data was received from 95 institutions -- 45 colleges and universities, 9 junior colleges, and 41 elementary and secondary schools. The median number of autio receiving stations for all levels combined is 46. The distribution and median for each level is shown in Figure 2b on the preceding page.

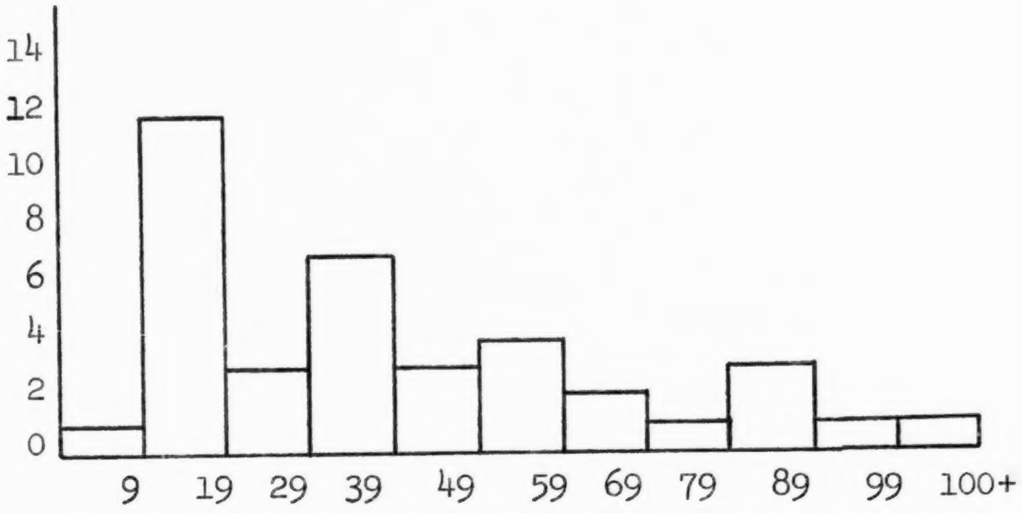
Twelve institutions reported video capability with their Dial Access systems. One-half of these are in elementary and secondary schools, five are at the college level, and only one in a junior college. The number of video receiving stations at a single location ranged from 4 to 85, with a median of 18 stations for each level.

Ninety-four institutions responded to the question of initial cost for a Dial Access system. Of those, 45 were colleges and universities, 11 junior colleges, and 38 elementary and secondary schools. Initial costs range from less than $10,000 to over $100,000; the median initial cost being $56,000. Distribution and median for each level are shown in Figure 3b on the following page.

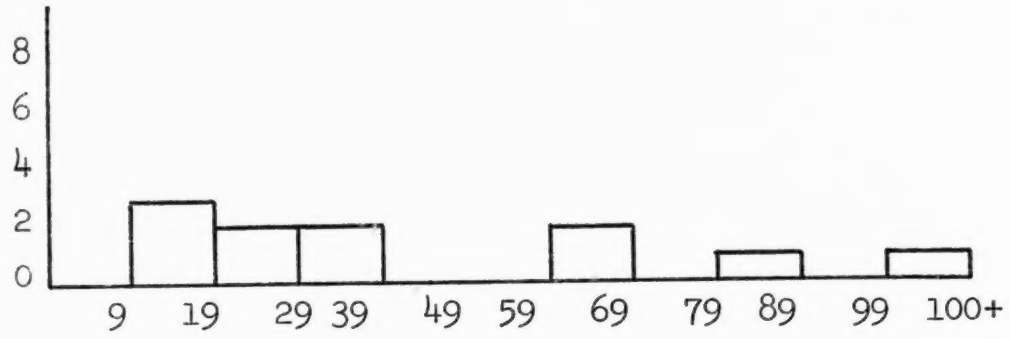
Only half of the institutions responded to questions relating to instructional use of the Dial Access system. The questionnaire asked the total number of subjects in which the system is used; if the system is used for more or less than 50% of course content presentation; if it is used (and in which subject areas) as prime method, teacher-mediated instruction, review, enrichment, or remedial instruction. At the secondary school and junior college level, respondents were almost equally divided as to the 50 percent level of system use in foreign languages. Apparently, even in schools with language laboratories, the Dial Access system is not being utilized to free the instructor from more than half of the course presentation. All other subject areas utilized the system for less than 50 percent of course content presentation.

In 15 subject matter areas the system is used as teacher-mediated instruction for seven of the subjects; as enrichment in seven of the subjects, and as the prime method in only one of the subjects.

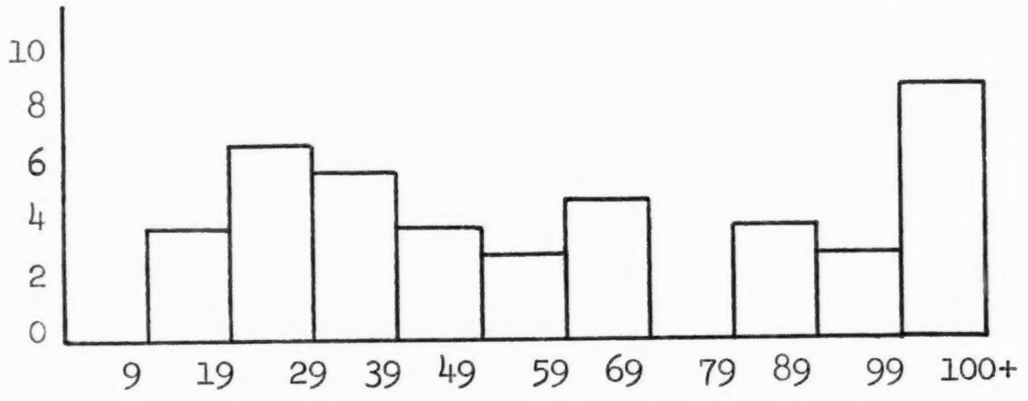
Figure 3b: INITIAL COSTS REPORTED BY 94 INSTITUTIONS FOR A DIAL ACCESS SYSTEM IN THOUSANDS OF DOLLARS



Elementary & Secondary Schools Median: $35,000



Junior Colleges Median: $35,000



Colleges & Universities Median: $55,000

The number of different subject areas available on the system ranges from 1 to 16 -- 30 percent of the schools having only one subject, 39 percent having either 2, 3, or 4 subjects, and 16 percent having 7 or 8. Of those responding to this question, only 3 institutions had more than 8 subjects in the Dial Access system.

Data From On-Site Visits

In addition to the country-wide survey of the State of the Art, the Center for Education Technology conducted on-site visits to ten selected operational Dial Access systems: 5 universities and colleges (Grand Valley State College, Allendale, Michigan; Ohio State University, Columbus; Oklahoma Christian College, Oklahoma City; Oral Roberts University, Tulsa, Oklahoma; University of Hartford, Hartford, Connecticut), 1 junior college district with 3 colleges (St. Louis Junior College District, Missouri), and 4 elementary-secondary (Alexis I. DuPont Special School District, Greenville, Delaware; Beverly Hills Unified School District, California; Clark County School District, Las Vegas, Nevada; West Hartford Public Schools, Connecticut).

Structured questionnaires and attitude scale instruments were administered to students, faculty and administrators, and technical personnel at each site. The responses to these questionnaires were tabulated, coded, and quantified. An analysis of the data is presented in the following pages.

The Semantic Differential Attitude Inventory* was administered to 435 students and 150 faculty and administrators during the 10 site visits. This inventory was used to determine their attitudes toward 12 types of instructional media, including Dial Access systems. Subjects were asked to rate the twelve types of media on 10 bipolar scales, selected for their high saturation on the evaluative factor. The potency and activity factors were not used.

---

* Osgood, Suci, and Tannenbaum (1957)

The students' attitudes showed the highest score (positive attitude) toward -- films, textbooks, dial access systems, carrels, audio tape recorders, in that order. The faculty showed positive attitudes toward -- audio tape recorders, audio tapes, carrels, slides, slide projectors, in that order. Although all the media were rated in the category "very positive," the lowest in this range were Instructional Television and Programmed Instruction. (See Figure 4b on page 100). When the attitudes of students were compared toward the various media, there was no significant difference.

Responses from the structured interviews served to corroborate the data obtained on the original questionnaire mailed to the individual institutions. The significant data and findings of the on-site interviews are tabulated according to faculty and student responses on the following pages.

FACULTY

Actively Using DAIRS		DAIRS an Effective Instructional Technology	
71	Yes	75	Yes
9	No	8	No
12	No Response	9	No Response

Use Commercial Materials

63	Yes	18	No	11	No Response

Provision at Institution for		Provision for Training in Materials Preparation	
34	Preparing Own Materials	56	Yes
32	Modifying Commercial Materials	22	No
34	Prepare Materials with Staff	14	No Response
33	A/V Consultants in Materials Preparation		

Time Spent Preparing Materials		If More Time, are you compensated?	
42	Much More Time	12	Yes
20	About the Same Time	32	No
4	Less Time		
26	No Response		

Release Time for Materials Preparation

22	Yes	44	No	26	No Response

STUDENTS

Use DAIRS

441	Yes
33	No

Like DAIRS

427	Yes
42	No
5	No Response

Wish to Use More

345	Yes	75	No	28	No Response

Advantages

(1)	300	Convenience
(2)	281	Can make-up work
(3)	238	Accessibility

Disadvantages

(1)	119	Not enough variety
(2)	108	Time-consuming
(3)	85	Not enough response

Carrel Location Preference

(1)	200	Library
(2)	95	Residence Halls
(3)	65	Classrooms

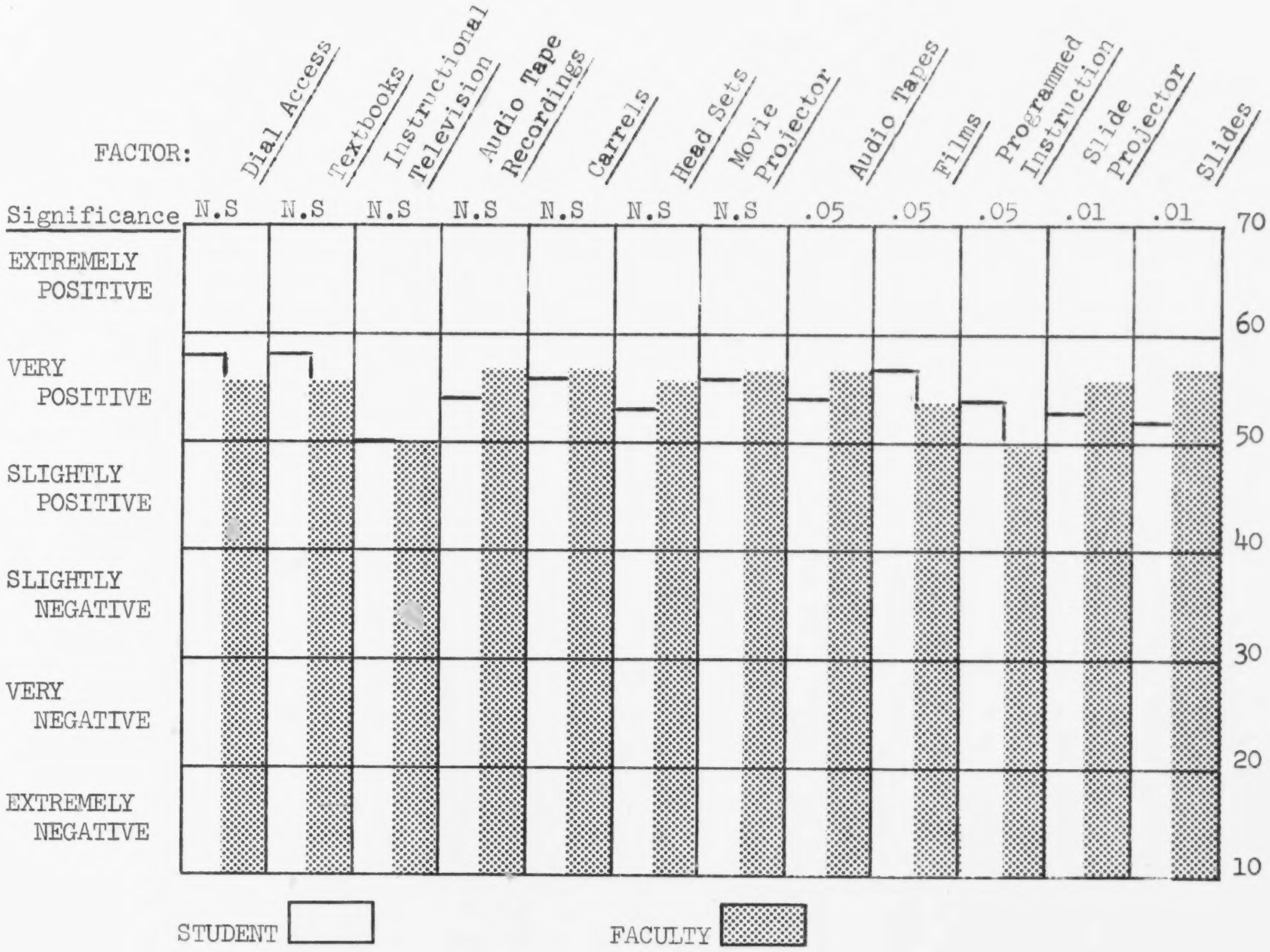
Preference for Use

369	For Individuals in Carrels
66	For Groups in Classrooms
16	No Response

Subjects Taken on DAIRS

188	Language	16	Art	86	English	101	History
5	Mathematics	68	Music	73	Science	106	Other

Figure 4b: FACULTY AND STUDENT ATTITUDES TOWARD SELECTED MEDIA BASED ON SEMANTIC DIFFERENTIAL SCALE TEST ADMINISTERED AT 10 INSTITUTIONS.



APPENDIX C

SOURCES OF AUDIOVISUAL SOFTWARE

ACADEMIC RECORDING INST., 4727 Oakshire, Houston, Tex. 77027.
Recorded discussion by noted scholars (records and tapes).

ACADEMY FILMS INC., 748 N. Seward St., Hollywood, Calif. 90038.
Films, filmstrips.

ACI PRODUCTIONS INC., 16 W. 46th St., New York, N.Y. 10036.
Educational films.

ALEMANN FILMS, P.O. Box 76244, Los Angeles, Calif. 90005.
16mm educational films.

AMIDON ASSOCIATES, Minneapolis. Minnesota.
Mostly lecture material -- college.

AMERICAN ARCHIVE OF ENCYCLOPEDIA CINEMATOGRAPHICA, Pennsylvania State University, University Park, Pa.

AMERICAN LIBRARY ASSOCIATION, 50 E. Huron St., Chicago, Ill. 60611.
African Encounter. Bibliography of films and other materials on Africa for young adults. ($1.50) Annotated.

ASSOCIATED EDUCATIONAL MATERIALS CO., INC., P.O. Box 2087m, Raleigh, N.C. 27602.
Prerecorded tapes, filmstrips, soundstrips.

ATLANTIC PRODUCTIONS, 894 Sheffield Pl., Thousand Oaks, Calif. 91360.
Films, filmstrips & literature.

ASSOCIATION INSTRUCTIONAL MATERIALS, 600 Madison Ave., New York, N.Y. 10022.
Free sale and rental of films and filmstrips.

AUDIOVISUAL INSTRUCTION, Department of Audiovisual Instruction, National Education Assn., 1201 - 16th St., N.W., Washington, D.C. 20036.

AUDIOVISUAL SOURCE DIRECTORY, Motion Picture Enterprises publications, Inc., Tarrytown, N.Y. 10591.

AUGUST BLUE BOOK OF AUDIOVISUAL MATERIALS, Educational Screen and Audiovisual Guide, 434 S. Wabash, Chicago, Ill. 60605. ($1.00)

AVIS FILMS INC., 2408 W. Olive Ave., Burbank, Calif. 91506.

BAILEY FILMS, 6509 DeLongpre Ave., Hollywood, Calif. 90028.
Regular and sound filmstrips, films.

BASIC SKILLS INC., 516 W. 34th St., New York, N.Y. 10001.
Regular and sound filmstrips, prerecorded magnetic 8 and 16mm tapes.

STANLEY BOWMAR CO. INC., 4 Broadway, Valhalla, N.Y. 10595.
Filmstrips, records and tapes.

ROBERT J. BRADY CO., 130 Q St., N.E., Washington, D.C. 20002.
8mm film loops, filmstrips.

BRIGHAM YOUNG UNIVERSITY, Provo, Utah 84601.
16mm educational films.

CAEDMON RECORDS INC., 461 Eighth Ave., New York, N.Y. 10001.
Spoken Word records and prerecorded tapes.

CHARLES CAHILL & ASSOCIATES, P.O. Box 3220, Hollywood, Calif. 90028.
Educational films.

CAROUSEL FILMS INC., 1501 Broadway, New York, N.Y. 10036.
Films, filmstrips.

CATHEDRAL FILMS FOR EDUCATION, 2921 W. Alameda Ave., Burbank, Calif. 91505.
Films, filmstrips (color and sound).

CENCO EDUCATIONAL FILMS, 2600 S. Kostner Ave., Chicago, Ill. 60623.
Films and filmstrips for science, math, social studies, reading language.

CENTER FOR INSTRUCTIONAL TELEVISION, Eastern Educational Network, Cambridge, Mass. 02139.

CENTER FOR MASS COMMUNICATION, 440 W. 110th St., New York, N.Y. 10025.
Films.

CHANDLER PUBLISHING CO., 124 Spear St., San Francisco, Calif. 94105.
8mm film loops, sound filmstrips, records, prerecorded magnetic tapes.

CHURCHILL FILMS, 662 N. Robertson Blvd., Los Angeles, Calif. 90069.
16mm sound classroom films.

CLASSROOM FILM DISTRIBUTORS INC., 5710 Hollywood Blvd., Hollywood, Calif. 90028.
Films, filmstrips, prerecorded tapes.

JOHN COLBURN ASSOCIATES INC., 1215 Washington Ave., Wilmette, Ill. 60091.
Films, filmstrips and related AV equipment.

CORONET INSTRUCTIONAL FILMS, Coronet Bldg., Chicago, Ill. 60601.
8 and 16mm films, filmstrips, 8mm film loops.

CURTIS AUDIO VISUAL MATERIALS, Independence Sq., Philadelphia, Pa. 19105.
Filmstrips, films.

WALT DISNEY 16mm FILMS, 800 Sonora Ave., Glendale, Calif. 91201.
Educational films, 8mm single concept films.

DU ART FILM LABORATORIES INC., 245 W. 55th St., New York, N.Y. 10019.
U.S. Government films.

DuKANE CORPORATION, Audiovisual Division, 103 N. 11th Ave., St. Charles, Ill. 60174.
Publishes an Audiovisual Source Directory.

THE EALING CORP., 2225 Massachusetts Ave., Cambridge, Mass. 02140.
8mm single concept film loops.

EDUCATIONAL ACTIVITIES INC., Box 392, Freeport, Long

Island, N.Y. 11520.
Instructional records, sound filmstrips, prerecorded tapes.

EDUCATIONAL DEVELOPMENTAL LABORATORY, 284 Pulaski Rd., Huntington, N.Y. 11744.
Filmstrips (sound), records, prerecorded magnetic tapes.

EDUCATIONAL MEDIA INDEX, McGraw-Hill Book Co., 330 W. 42nd St., New York, N.Y. 10036.
Comprehensive listing of all types of instructional materials. Master title index in Vol. 14.

EDUCATIONAL READING SERVICE INC., East 64 Midland Ave., Paramus, N.J. 07652.

EDUCATIONAL RECORD SALES, 157 Chambers St., New York, N.Y. 10007.

EDUCATIONAL SCREEN AND AUDIOVISUAL GUIDE, 434 S. Wabash Ave., Chicago, Ill. 60605.

EDUCATIONAL TECHNOLOGY BULLETIN, "Selected Sources of Audiovisual Materials", Department of Audiovisual Instruction, National Education Assn., Washington, D.C. 20036.

EDUCATORS GUIDE TO FREE FILMS, (comp. and ed., Horkheimer and Diffor). Educators Progress Service, Randolph, Wisc. Revised annually.

EDUCATORS GUIDE TO FREE TAPES, SCRIPTS, AND TRANSCRIPTIONS, (comp. and ed., Wittich and Halsted). Educators Progress Service, Randolph, Wisc. Revised annually.

EMC Corp., 180 E. 6th St., St. Paul, Minn. 55101.
Educational recordings with guides/books.

ENCYCLOPEDIA BRITANNICA EDUCATIONAL CORP., 425 Michigan Ave., Chicago, Ill. 60611.
8 and 16mm films, sound filmstrips, recorded discs, prerecorded tapes.

ENRICHMENT TEACHING MATERIALS, 246 Fifth Ave., New York, N.Y. 10001.
Educational records, filmstrips.

EYE GATE HOUSE INC., 146-01 Archer Ave., Jamaica, N.Y. 11435.
Filmstrips, tapes, 8mm films and charts.

FILM ASSOCIATES, 11559 Santa Monica Blvd., Los Angeles, Calif. 90025.
16mm films, 8mm film loops, filmstrips.

FILM EVALUATION GUIDE, Educational Film Library Assn., Inc., 250 W. 57th St., New York, N.Y. 10019.

FLEETWOOD FILMS INC., 34 MacQuesten Pkwy. S., Mt. Vernon, N.Y. 10550.
16mm films.

FOLKWAY/SCHOLASTIC RECORDS, 50 W. 44th St., New York, N.Y. 10036.
Educational records (K-12).

GENERAL ELECTRONIC LABORATORIES, 1085 Commonwealth Ave., Boston, Mass. 02215.
8mm filmstrips, overhead transparencies, prerecorded magnetic tapes.

GENERAL LEARNING CORP., 3 E. 54th St., New York, N.Y. 10022.
Physical education films for elementary grades.

THE GRAPHIC CURRICULUM INC., 49 W. 45th St., New York, N.Y. 10036.
Educational 16mm films.

GREAT PLAINS NATIONAL INSTRUCTIONAL TELEVISION LIBRARY, University of Nebraska, Lincoln, Neb. 65805.
Informational materials about recorded instructional TV courses.

HALVORSON ASSOCIATES, P.O. Box 9975, Chevy Chase, Md.
Voice tapes of the classics.

IMPERIAL PRODUCTIONS INC., 247 W. Court, Kankakee, Ill. 60901.
Prerecorded magnetic tapes.

THE INDEPENDENT FILM PRODUCERS CO., 334 E. Green St., Pasadena, Calif.
16mm films.

INDIANA UNIVERSITY AUDIO VISUAL CENTER, Bloomington, Ind. 47401.
16mm educational films.

INSTITUTE OF MODERN LANGUAGES INC., 1666 Connecticut Ave., N.W., Washington, D.C.
Tapes (remedial reading; originators of English as a foreign language).

INTERNATIONAL COMMUNICATION FILMS INC., 870 Monterey Pass Rd., Monterey Park, Calif. 91754.
8 and 16mm films, 8mm film loops, sound filmstrips, records, prerecorded tapes.

INTERNATIONAL FILM BUREAU INC., 332 S. Michigan Ave., Chicago, Ill. 60604.
16mm educational films, 35mm filmstrips, 8mm films.

INTERNATIONAL TEACHING TAPES, First National Bank Bldg., Tulsa, Okla. 74103.
Prerecorded magnetic tapes.

I Q FILMS INC., 689 Fifth Ave., New York, N.Y. 10022.
16mm films.

JAM HANDY ORGANIZATION, 2821 E. Grand Blvd., Detroit, Mich. 48211.
Filmstrips, 8 and 16mm films, records, prerecorded magnetic tapes.

JOURNAL FILMS INC., 909 W. Diversey Pkwy., Chicago, Ill. 60614.
16mm educational films.

KING SCREEN PRODUCTIONS, 320 Aurora Ave. N., Seattle, Wash. 98109.
Educational films.

LEARNING MACHINES INC., Box 511, Portales, New Mexico 88130.
Audiotape programs.

McGRAW-HILL FILMS, 330 W. 42nd St., New York, N.Y. 10036.
Educational audiovisual materials.

MIDWEST PROGRAM ON AIRBORNE TELEVISION INSTRUCTION INC., Memorial Center, Purdue University, Lafayette, Inc. 49707.

NATIONAL ASSOCIATION OF EDUCATIONAL BROADCASTERS (NAEB), 1346 Connecticut Ave., N.W., Washington, D.C.

NATIONAL AUDIO TAPE CATALOG, (prepared by the National Center for Audio Tapes, Stadium Bldg., University of Colorado, Boulder, Colo. 80302). Catalog at $3 from the National Education Assn., Division of Audio visual Instruction, 1201 - 16th St., N.W., Washington, D.C. 20036. Tapes available at cost from DAVI's National Tape Repository.

NATIONAL CENTER FOR AUDIO TAPES (see above). A published set of guidelines for audiotape libraries is available at $1 per copy. Duplicate copies of the library's tape programs can be requested.

NATIONAL CENTER FOR SCHOOL AND COLLEGE TELEVISION, Box A, Bloomington, Ind. 47401. Prerecorded instructional TV programs.

NATIONAL FILM BOARD OF CANADA, 680 Fifth Ave., Suite 918, New York, N.Y. 10019. AV materials, films, filmstrips, and slides.

NATIONAL INFORMATION CENTER FOR EDUCATIONAL MEDIA (NICEM), University of Southern California, Los Angeles, Calif. 90007. Nonbook catalog production.

NATIONAL TAPE REPOSITORY (same as National Center for Audio Tapes).

NEUBACHER-VETTER FILM PRODUCTIONS, 1750 Westwood Blvd., Los Angeles, Calif. 90024. Classroom films.

NEW EDUCATIONAL MATERIALS, Professional Books Editor, Scholastic Magazines, Inc., Citation Press, 50 W. 44th St., New York, N.Y. 10036. (1967).

NEW YORK UNIVERSITY FILM LIBRARY, 26 Washington Pl., New York, N.Y. 10003.

Educational, scientific and documentary films.

HANK NEWENHOUSE INC., 1825 Willow Rd., Northfield, Ill. 60093.
Films, filmstrips.

POPULAR SCIENCE PUBLISHING CO. INC., Audiovisual Division, 355 Lexington Ave., New York, N.Y. 10017.
Films, transparencies, film loops, slides.

RECORDINGS FOR CHILDREN, 2nd Edition, 1964. Available for $1 from the Office of Children's Services, New York Public Library, 20 W. 53rd St., New York, N.Y. 10019.

RECORDINGS IN THE PUBLIC LIBRARY, Mary D. Pearson (1963). Available from the American Library Assn., 50 E. Huron St., Chicago, Ill. 60611.

RUFSVOLD, M.I. and GUSS, C., Guides to Newer Educational Media: Films, Filmstrips, Kinescopes, Phonodiscs, Phototapes, Programmed Instruction Materials, Slides, Transparencies, Videotapes, 2nd Edition, (1967).
American Library Assn., 50 E. Huron St., Chicago, Ill. 60611.

SANDAK INC., 4 E. 48th St., New York, N.Y. 10017.
Color slides.

"A SELECTED LIST OF GUIDES TO NEWER EDUCATIONAL MEDIA", Audiovisual Instruction, January 1967.

SIGMA EDUCATIONAL FILMS, 11717 Ventura Blvd., P.O. Box 1235, Studio City, Calif. 91604.

SKILLTAPES, Charles E. Merrill Books, 1300 Alum Creek Dr., Columbus, Ohio (1967).

SOURCES OF AUDIOVISUAL MATERIALS, Superintendent of Documents (Cat. No: FS 5.235:35090), U.S. Government Printing Office, Washington, D.C.

SPOKEN ARTS INC., 59 Locust Ave., New Rochelle, N.Y. 10801.
Records, prerecorded tapes, multi-media filmstrip kits.

STANDARDS FOR CATALOGING, CODING AND SCHEDULING EDUCATIONAL MEDIA, Division of Audiovisual Instruction, American Education Assn., 1201 - 16th St., N.W., Washington, D.C. 20036.

STANTON FILMS, 7934 Santa Monica Blvd., Los Angeles, Calif. 90046.
Films, 16mm.

STERLING EDUCATIONAL FILMS, 241 E. 34th St., New York, N.Y. 10016.
8 and 16mm films.

TAPE EXCHANGE, National Center for School and College Television, Indiana University, Bloomington, Ind. 47401.
Prerecorded instructional TV programs.

TAPES FOR TEACHING, (covers taped programs for 26 subject areas). Available for $1 from Audiovisual Center, Kent State University, Kent, Ohio 44240.

TAPES UNLIMITED, 13113 Puritan Ave., Detroit, Mich. 47227.
Prerecorded educational tapes.

TEACHING FILMS INC., Division of A-V Corp., 2518 North Blvd., Houston, Tex. 77006.
Teaching films and learning systems.

TEACHING TECHNOLOGY CORP., 5520 Cleon Ave., North Hollywood, Calif. 91601.
Filmstrips, records, prerecorded magnetic tapes.

UNIVERSAL EDUCATION AND VISUAL ARTS, 221 Park Ave. S., New York, N.Y. 10003.
Educational films, filmstrips.

H. WILSON CORP., 555 W. Taft Dr., South Holland, Ill. 60473.
Educational tapes and records, A-V materials.

APPENDIX D

EQUIPMENT: SOURCES AND SPECIFICATIONS

Sources

Ampex Corporation
Audio-Visual Communications Division
Redwood City, California 94063
Tel. (415) 367-2721
Mr. Jerome J. Dover, Mgr., Special Products Dept.

Chester Electronic Laboratories, Inc.
Chester, Connecticut 06412
Tel. (203) LA 6-5325
Mr. David L. Joslow, Exec. Vice President

Continuous Progress Education, Inc.
719 State Street E.
Westport, Connecticut 06880
Tel. (203) 266-0738
Mr. Richard J. Davis, Educ. Engineering Mgr.

General Electronic Laboratories, Inc.
1085 Commonwealth Avenue
Boston, Massachusetts 02215
Tel. (617) 783-0460
Mr. Joseph C. Worth, Jr., Vice President
Mr. Edward Martin, Sales Manager

Omnilab Incorporated
Box 91
Couderay, Wisconsin 54828
Tel. (715) 462-3694
Mr. Irving F. Olsen, Dir. of Educational Research

Raytheon Learning Systems Company
(Div. of Raytheon Education Co.)
475 S. Dean Street
Englewood, New Jersey 07631
Tel. (201) 576-0020
Mr. Richard Cook, Audio Products Coordinator

Robert C. Merchant Company
P.O. Box 240
Carmel Valley, California 93924

Tel. (408) 659-2255
Mr. Robert C. Merchant, President

North Electric Company
Electronics Division
Galion, Ohio 44833
Tel. (419)468-2420
Mr. Robert J. Williams, Product Mgr.-Systems

Radio Corporation of America
Eastern Professional TV & Systems Sales
RCA Building 15-4
Camden, New Jersey 08102
Tel. (609) 963-8000, Ext. 2022
Mr. Charles J. Gaydos, Sales Manager

Specification Charts

The following six pages contain the specifications for dial access equipment, supplied by the nine manufacturers with a total system capability. They should be considered effective as of April 1, 1968, but may have been superseded since that time.

It should be kept in mind that to make a decision to purchase or not to purchase merely on the basis of specifications, could be an error, since no indication of other parameters are given such as durability, reliability, styling, ease of operation and maintenance, availability of spare parts and service, etc. Also, in their equipment literature the manufacturers do not state the testing conditions under which the specifications were obtained, with the result that better stated specifications actually accompany inferior performance.

In view of these limitations it is felt that the specifications will best accomplish the following:

1. Give technical personnel and other qualified persons a good overview of the type of equipment capabilities that are available.

2. Indicate what features and what range of characteristics are available from any of the several manufacturers.

3. Provide insight into the degree of exactness with which specifications must be drawn up, and a better appreciation for the importance or uniqueness of the particular specifications cited by the manufacturer.

Some of the terms used in the Specification Charts are cited in the Glossary, others are not. The criteria for placing them in the Glossary was that they had appeared in the text.

To read the Charts, reference should first be made to the underlined headings in the rightmost column, such as, "Audio Master Tape Transports", "Audio Student Tape Transports", "Video Tape Drives", etc. When the proper category is found, the characteristics within that category should be examined. For example, if one wanted to know what types of selection devices were available, reference would be made to the heading "Select Devices", and then the entries below the heading examined. This would reveal that all the companies listed, except one, supply telephone-type dials, four supply push-button selectors, etc.

It is important to note that due to space limitations all the manufacturers' capabilities may not be reflected on the Charts, therefore they should be consulted for specific inquiries or further clarification.

AUDIO TAPE TRANSPORTS

		OMNILAB INC.	ROBERT C. MERCHANT COMPANY	CHESTER ELECTRONIC LABS.	RCA	RAYTHEON LEARNING SYSTEMS	NORTH ELECTRIC CO.	CONTINUOUS PROGRESS EDUCATION	GENERAL ELECTRONIC LABS.		AMPEX CORP.	AUDIO MASTER TAPE TRANSPORTS
		REEL	REEL OR CASSETTE	REEL	REEL OR CARTRIDGE	REEL OR CARTRIDGE	REEL	REEL	REEL or CARTRIDGE		ENDLESS LOOP BIN	TYPE
		7"	UP TO 10½	UP TO 10½"	8"	MAGAZINE 5" or 7"	UP TO 8"	UP TO 7"	REEL- 7" CART ½to45min		250' LOOP OPTIONAL	REEL SIZE
		HYST.SYNC.	OPTIONAL	HYSTERESIS SYNCHRONOUS	HYST. SYNC.	4 POLE SHADED	HYSTERESIS SYNCHRONOUS	HYSTERESIS SYNCHRONOUS	INDUCTION or HYSTERESIS			CAPSTAN DRIVE MOTOR
		1/4"	1/4 to 2"	1/4"	1/4"	½"	1/4"	1/4"	1/4"		1"	TAPE WIDTH
			SERVO	PUSH BUTTON ELECTRONIC		SERVO or RELAY	SOLENOID		SOLENOID CONTROL			MODE ACTUATION DEVICE
		1, 2, 4	1,2,3,4 OR 32	4	4	4	1,2 or 4	4+Cue	4		32	NUMBER OF SIMULTANEOUS TRACKS
		3-3/4,7-1/2 ips	7.5 ips	$3^{3}/4$ - 7½ ips	$3^{3}/4$ - 7½ ips	$1^{7}/8$ - $3^{3}/4$ or 7½ ips					[illegible] ips	RECORDING SPEED
				NA					1:1		120 ips	TRANSFER SPEED
			2 HRS	3 HRS.	1 1/2 HRS.	30 MIN. MAG. 90 MIN. REEL	1 Hr.@7-1/2 ips		REEL- 1hr CART- 45min		15 MIN. OPTIONAL	MAX. PROGRAM DURATION
		30	57 SEC	30 SEC.	53 SEC.	35 SEC.	56 SEC.	40 SEC.	40 sec.		-0-	REWIND TIME FOR 800 FT.
			50-10K Hz @3.75 ips	50-15K Hz ± 3db	50-15K Hz ±2db@7 1/2 ips	50-12K Hz ±3 db@$3^{3}/4$ ips	100-15K Hz ±2 db@7.5ips	50-9K Hz ±4db@3.75 ips	50-15K Hz ±2 db.		4K-320Kcps ±3db@120ips	FREQUENCY RESPONSE
			TO 80db	60 db	55 db	45 db.	GREATER THAN 50 db		50 db.		35 db	SIGNAL/NOISE RATIO
		.1% @ 7-1/2 ips	.2%	.15%	.17% @ 7½ ips	.3% @$3^{3}/4$ ips	LESS THAN .3% @3.75ips	.2% @7½ips	.2%		.3% @120 ips rms	WOW & FLUTTER
			1%	LESS THAN 1% IM		1%	LESS THAN 2% @ MAX.OUT.		LESS THAN 3% @10 db. abv. rtd. out		1% thd	DISTORTION
		PHOTO CELL	YES		NO	DIAL or PHOTO		DIAL OR DIGITAL	PHOTO CELL			AUTOMATIC CUING OF TAPE SEGMENT?
			OPTIONAL	OPTIONAL	NO	OPTIONAL	OPTIONAL		NO		NO	STUDENT CONTROL?
												AUDIO STUDENT TAPE TRANSPORT
		REEL	REEL	REEL	REEL	REEL OR CARTRIDGE	REEL	REEL	REEL OR CARTRIDGE		ENDLESS LOOP BIN	TYPE
		EITHER	EITHER	REMOTE	EITHER	EITHER		REMOTE	EITHER		REMOTE	REMOTE OR LOCAL
		7"	7"	7"	7"	UP TO 7"	UP TO 8"		REEL- 7" CART ½to45min		250' LOOP	REEL SIZE
		HYSTERESIS	OPTIONAL	4 POLE SHADED OR HYST.	HYST. SYNC.	4 POLE SHADED	HYSTERESIS SYNCHRONOUS		INDUCTION or HYSTERESIS			CAPSTAN DRIVE MOTOR
			SERVO	PUSH BUTTON	REMOTE PNL. SEE 15-310	SERVO or RELAY	SOLENOID		SOLENOID		DIODE	MODE ACTUATION DEVICE
		2	1,2,3,OR 4		4	2	1,2 or 4	2	2		2	NUMBER OF SIMULTANEOUS TRACKS
			NORMAL		$3^{3}/4$ - 7½ ips						120 ips	TRANSFER SPEED
			2 HRS	90 MIN.	2 1/2 HRS.	30 MIN. MAG. 90 MIN. REEL	1 Hr.@7-1/2 ips		REEL- 1hr CART- 45min		15 MIN. OPTIONAL	MAX. PROGRAM DURATION
		30	57 SEC.	30 SEC.	53 SEC.	35 SEC.	56 SEC.		40 sec.		-0-	REWIND TIME FOR 800 FT.
			50-10K Hz ± 2db	50-15K Hz ± 3db	50-15K Hz ±2 db@ 7½ ips	50-12K HZ ±3 db@$3^{3}/4$ ips	100-15K Hz ±2db @7.5ips		50-15K Hz ±2 db.		100-8K Hz	FREQUENCY RESPONSE
			DETERMINED BY TAPE	55 db	55 db	45 db.	GREATER THAN 50db		50 db.		-40db	SIGNAL/NOISE RATIO
		.2% @3-3/4 ips	0.2%	.2%	.17% @ 7½ ips	.3% @ $3^{3}/4$ ips	LESS THAN .3% @3.75ips		.2%			WOW & FLUTTER
			1%	LESS THAN 1%		1% THD	LESS THAN 2% @ MAX. OUT.		LESS THAN 3% @10 db. abv. rtd. out			DISTORTION
			OPTIONAL	YES	YES - SKIP FORWARD	DIAL or PHOTO			PHOTO CELL		NO	AUTOMATIC CUING OF TAPE SEGMENT?
			OPTIONAL	PUSH BUTTON	YES	YES REMOTE	OPTIONAL		YES		YES	STUDENT CONTROL
		YES	YES	YES OR NO	YES	YES		YES	YES		YES (RECUE)	STOP, REWIND, PLAYBACK
		YES	YES	YES	YES	NO			NO		YES	SKIP AHEAD CAPABILITY
		YES	YES	YES	YES	MAG.-YES REMOTE-YES		YES	YES		YES	TAMPER PROOF
			YES									SKIP BACK & REPEAT

J P 10/26/67
Revised 4/23/68

VIDEO SOURCES and SYSTEMS SPECIFICATIONS

		OMNILAB INC.	ROBERT C. MERCHANT CO.	CHESTER ELECTRONIC LABS.	RCA	RAYTHEON LEARNING SYSTEMS	NORTH ELECTRIC CO.	CONTINUOUS PROGRESS EDUCATION	GENERAL ELECTRONIC LABS.		AMPEX CORP.	
												VIDEO TAPE DRIVES
			YES	YES	YES	YES	YES	YES	YES			AVAILABLE
			OPTIONAL	YES	NO	REMOTE	USE RCA LINE		EQUIPMENT CHOSEN TO COINCIDE WITH SPECIFIC APPLICATION			STUDENT STOP, START
			30-4.2 M Hz	10-4.2M Hz	4.2M Hz	30-3.5M Hz		30 -3.5M cps				FREQUENCY RESPONSE
			335LINES	380 LINES		350 LINES		350 LINES				HORIZONTAL RESOLUTION
			40 db	40 db	40 db	42db		42 db				SIGNAL/NOISE RATIO
			75 OHMS	75 OHMS	75 OHMS	75 OHMS		75 OHMS				INPUT IMPEDANCE
			75 OHMS	75 OHMS	75 OHMS	75 OHMS		75 OHMS				OUTPUT IMPEDANCE
			6.9 ips	6.8 ips	6.9 ips	9.6"/SEC.		9.6 "/SEC.				TAPE SPEED
			60 MIN	1 HR.	60MIN.	60MIN.		60 MIN.				RECORD/PLAY TIME
				90 SEC.	90 SEC.	4 MIN.		4 MIN.				REWIND TIME
			80-10K Hz	50-10K Hz	50-10K Hz	50-12K Hz		50-12K cps				AUDIO RESPONSE
			40 db	40 db	40 db	42db		42 db				AUDIO SIG./NOISE RATIO
			200 OHMS	600 OHMS	200 OHM	200 OHM		200 OHM				AUDIO INPUT IMPEDANCE
			600 OHMS	600 OHMS	600 OHM	600 OHMS		600 OHM				AUDIO OUTPUT IMPEDANCE
			ON SOME	YES	YES	YES		YES				SEPARATE CUE TRACK
			600 OHMS	600 OHMS	600 Oh	600 OHM		600 OHM				CUE CIRCUIT IMPEDANCE
												OTHER VIDEO SOURCES
			YES	YES	YES	YES			YES			16 mm PROJECTOR
			OPTIONAL	YES	NO	YES	YES					STUDENT STOP/START
			YES	YES	YES	YES	YES		YES			FILM CHAIN
			YES	YES	YES	YES	YES		YES			SLIDE PROJECTOR
			YES	YES	YES	YES	AVAILABLE		YES			REMOTE SLIDE CONTROL
			YES	YES	YES	YES	YES		YES			FILM STRIP PROJECTOR
			YES	NO	YES	YES	YES	YES				REGULAR TV
			YES	YES	YES	YES	YES	YES	YES			CLOSED CIRCUIT TV
			YES	NO	NO	NO	YES					SLOW SCAN TV
			YES	YES	YES	YES						MULTIPLEXER UNIT
			YES									TELEMETERED VIDEO
												AUDIO SYSTEM SPECIFICATIONS
		50-15K Hz ±3db	7-70K Hz ± 1 db	50-15K Hz @ 7.5 ips	50-15K Hz ±2db @7½ips	50-12K Hz	30-15K Hz TOT. SYST.		50-12K Hz ±3db		100-8K cps	FREQUENCY RESPONSE
		-50 db	-80 db	65 db	-55 db	-55db	BETTER THAN -55db		48db		--35db	SIGNAL/NOISE RATIO
		UNDER 2%	0.5%	LESS THAN 1%	LESS THAN 2%	Under 2%	50 db BELOW TEST TONE LEVEL		LESS THAN 3%		LESS THAN 2%	HARMONIC DISTORTION
			-80 db	-58 dbm	NEGLIGIBLE	-55db	-15dba WITH F1A WEIGHT.		INAUDIBLE AT NORMAL LEVEL		INAUDIBLE AT NORMAL LEVEL	BACKGROUND NOISE
			- 80 db	-55 dbm	50db min. @ 1K cps	-45db BTWN. TAPE HDS.	BETTER THAN -65 db		-45db @1k Hz		-40 db@1K cps NORMAL LEVEL	CROSSTALK

10/20/67
Revised 4/23/68

AUDIO AND VIDEO SWITCHING

		OMNILAB INC.	ROBERT C. MERCHANT CO.	CHESTER ELECTRONIC LABS.	RCA	RAYTHEON LEARNING SYSTEMS	NORTH ELECTRIC CO.	CONTINUOUS PROGRESS EDUCATION	GENERAL ELECTRONIC LABS.		AMPEX CORP.	
												AUDIO SWITCHING
			MODULAR XBAR.OPT.	COMPUTER DRIVEN CROSSBAR	ROTARY OR CROSSBAR	ROTARY	COMPUTER CONTROL XBAR	CROSSBAR	CODE BAR		BINARY RELAY MATRIX	TYPE OF SWITCHING
		UNLIMITED	40/UNIT	40/CABINET	40/UNIT	INDIVIDUAL FROM 1 UP	UNLIMITED-MULT.of 10		10 UP		UNLIMITED	No. of ACCESS LINES
		200 UP	300/UNIT	216/CABINET	94/UNIT	60-800	UNLIMITED		50 UP		UNLIMITED	NO. OF PROGRAM LINES
			24 OR 48VDC	24 VDC	48 VDC	24or48VDC	48V DC		48 VDC		28 vdc	OPERATING VOLTAGE
			2 LINES	2 LINES	2 LINES	4 LINES	2 LINES	2 LINES	2 LINES		NA	FEED LINE REQUIREMENTS
			.5 to 600 OHMS	250 OHMS	600 OHMS	200 OHMS	600 OHMS		600 OHMS		NA	LINE IMPEDANCE
			INDEPENDENT	RANDOM ACCESS		SIMULTANEOUS	RANDOM NO WAITING		SEQ.PRIORITY		NA	DIAL ACCESS ACCORDING TO
			7-70K Hz	DC-100K Hz	30-15K Hz	50-50K Hz	30-15K Hz ±3db	30-15K Hz ±5 db @1KHz	50-25K Hz ±1 db			FREQUENCY RESPONSE
			MODULAR	MODULAR	MODULAR	MODULAR	MODULAR	MODULAR	MODULAR		MODULAR	COMPONENTS
			PLUG & CONN	[illegible] BLOCK	PLUG & CONN.	PLUG & CONN	PLUG & CONN.	2 LINES	PLUG & JACK			INTER-CONNECTIONS
			YES	TELEPHONE LINE		YES	YES		YES		YES	LONG LINE COMPATABILITY
		YES	OPTIONAL	YES		NO	OPTIONAL		OPTIONAL		YES	PUSH BUTTON OPERATION?
		UNLIMITED	UNLIMITED	UNLIMITED	UNLIMITED	UNLIMITED	UNLIMITED	UNLIMITED	UNLIMITED		YES	EXPANSION POTENTIAL
				-90 dbm	-65 db	-60db	-60 db	-98 db @ 3.4K Hz	-75 db @ 3V, 20K Hz		65 db	CROSS TALK
			0 WITHOUT CROSSBAR	3 WATTS		0	20 MA/LINE		0 ma			D.C. HOLDING CURRENT
				NA	-40 db	-50db	-50 db		0			HARMONIC DISTORTION
			+4dbm @ 700 Hz	NA		NONE	-4 dbm @ 1K HZ	-4 dbm				TEST TONE LEVEL & FREQ.
			-80db	NOT MEASURBL.		-50db	-15dba WITH FIA WEIGHT	-15 db	0			BACKGROUND NOISE
			80db	98 db RELATIVE TO AUDIO OUTPUT	-45 db	-60db	BETTER THAN -55 db					SIGNAL/NOISE RATIO
												VIDEO SWITCHING
			AUDIO SWITCHGEAR	SOLID STATE LOGIC	CROSSBAR & CONTROL UNIT		COMPUTER		EQUIPMENT CHOSEN TO COINCIDE WITH SPECIFIC APPLICATION			SWITCHING CONTROLLED BY
			SOLID STATE	BALANCED PLUG-IN	SOLID STATE	ROTARY		SOLID STATE				MEANS OF SWITCHING
			MODULAR		MODULAR	MODULAR		MODULAR				COMPONENTS
			FROM AUDIO SWITCHGEAR	DIAL OR TOUCH TONE	DC FROM VIDEO CONTROL RACK	DIAL LINE		DC ON AUDIO CHANNEL				SWITCHING SIGNAL
				15 OHMS PER SOURCE	75 OHMS	75 OHM TERMINATION	SAME AS RCA	GREATER THAN 1K @ 1M Hz				TOTAL OUTPUT IMPEDANCE OF VIDEO SOURCES
			EACH IS DIST.AMP.	2V P-P @100 OHM BALANCED	SUFF. FOR 6 DIST AMPLS.	INDIV.AMP		SUFF. FOR 30 DIST.AMP.				POWER OUTPUT OF SWITCHING AMPLIFIER
			75 OHMS	75 OHMS	75 OHMS	75 OHMS		75 OHMS				INPUT IMPEDANCE
			75 OHMS	75 OHMS	75 OHMS	75 OHMS		75 OHMS				OUTPUT IMPEDANCE
			8M Hz ±2db	40-10M Hz ±.1 db	DC-8M Hz ± .5db	30-10M Hz ± 2db		10M cps ±5 db				FREQUENCY RESPONSE
			INAUDIBLE	-60 dbm	-60 db	-60db		-60 dbv				NOISE AND HUM
			0.5%	LESS THAN 1%	UNDER 1% @3.58M Hz	1%@3.5M Hz		1% @3.58MHz				DIFFERENTIAL GAIN
			INSIGNIF.	LESS THAN 1 DEGREE	UNDER 1 DEGREE	UNDER 2 DEGREES		UNDER 1 DEGREE				DIFFERENTIAL PHASE
			INSIGNIF.	0 ADJSTBLE	UNDER 1%	UNDER 2%		UNDER 1%				LOW FREQUENCY TILT
			-45db	-55db @ 3.58M Hz	-46 db @ 4M Hz	-55db @ 3.58M Hz		-50 db @ 3.58 MHz				CROSSTALK
			1-1.4V p-p	1-2 V p-p	.7V P-P NON-COMP.	1-1.4V p-p		1 to 1.2VP-				INPUT SIGNAL LEVEL
			1-1.4 V p-p	1-2V P-P	1V P-P COMPOSITE	1-1.4V p-p		1 to 1.4VP-				OUTPUT SIGNAL LEVEL
			UNITY	20 db	-UNITY GAIN ADJUSTABLE ±10%	UNITY		0-22 db				OVERALL GAIN
			105-125	100-130	115/230 V ± 10%	90-130		105-130				A.C. SUPPLY VOLTAGE VARIATION PERMITTED
			1	5	60	1 or MORE		20				NO. OF STATIONS/UNIT
			8	20	34	UP TO 20		18				NO. OF PROGRAMS/UNIT
			1,000 FT	1500 FT RG11	1200 FT	500 Ft.		1,000 FT.				MAX. CABLE LENGTH WITHOUT ADDITIONAL EQPT.

10/28/67
Revised 4/23/68

CARRELS AND ASSOCIATED EQUIPMENT

		OMNILAB INC.	ROBERT C. MERCHANT CO.	CHESTER ELECTRONIC LABS.	RCA	RAYTHEON LEARNING SYSTEMS	NORTH ELECTRIC CO.	CONTINUOUS PROGRESS EDUCATION	GENERAL ELECTRONIC LABS.		AMPEX CORP.	CARRELS AND EQUIPMENT
		30"	29" UP	28"	29½ OR 36"	36"	VARIABLE TO CUSTOMER REQUIREMENT	29"	36"		OPTIONAL	CARREL LENGTH
		24"	24" UP	18"	21 OR 24"	24"		22"	24"			CARREL DEPTH
												STUDENT RECORDER SEE AUDIO SOURCE-STUDENT TRANSPORT
												TV DISPLAYS
		9"	9"	9"	8 OR 9"	9"		9"	9"		9"	CARREL MONITOR SIZE
			OPTIONAL	IN-CARREL	IN-CARREL	IN CARREL		IN-CARREL	IN CARREL		OPTIONAL	RECESSED OR IN CARREL
			OPTIONAL	ANGLE OR STRAIGHT	EITHER	OPTIONAL		ANGLE	OPTIONAL		OPTIONAL	STRAIGHT OR AT AN ANGLE
		YES	OPTIONAL	NO	NO	YES		NO	OPTIONAL			STUDENT ADJUSTMENTS
			75 OHMS	75 OHMS	HIGH IMP. OR 75 OHMS	75 OHMS		75 OHMS	75 OHMS			INPUT IMPEDANCE
			OPTIONAL	NO-VIDEO ONLY	YES	OPTIONAL		YES	OPTIONAL			MONITOR ALSO A RECEIVER
			TO 27"	YES	YES	YES			YES			LARGE SCREEN FOR CLASSROOMS
			75 OHMS	75 OHMS		75 OHMS		75 OHMS	75 OHMS			INPUT IMPEDANCE
			600 LINES MINIMUM									MONITOR RESOLUTION
												AUDIO UNITS
		YES	YES	YES	YES	YES		YES	YES		OPTIONAL	PUBLIC ADDRESS UNIT FOR CLASSROOMS
		YES	YES	YES	YES	YES	YES	YES	YES		YES	INTERCOM
		YES	YES	YES	YES	YES						ALL-CALL
			YES	YES	YES	YES			YES		YES	CLASSROOM DIAL PANEL
												STUDENT RESPONSE MODES
		YES	ELECTROVOICE 630	YES	YES	YES	YES	YES	YES		YES	MICROPHONE
		YES	YES	NO	NO	OPTIONAL		YES	OPTIONAL		YES	MIKE-ON LIGHT
		PUSH BUTTON	OPTIONAL	BOTH	PUSH BUTTON	DIAL		DIAL	DIAL. PUSH BUTTON OPT.		YES	PUSH BUTTON OR DIAL
												SELECT DEVICES
			YES	YES	YES	YES	YES	YES	YES		YES	TELEPHONE TYPE DIAL
		YES	YES	NO	NO	NO			AVAILABLE		YES	PUSH BUTTON
			YES	YES	NO	OPTIONAL	REMOTE PUSH-BUTTON TONE SIGNALING OPTIONAL					SELECTOR SWITCH
			YES	YES	YES	REMOTE SWITCH					YES	REMOTE TOUCH-TONE
			YES	YES	YES	YES						DIGITAL DIAL
												OTHER FACILITIES
			OPTIONAL	YES	YES	YES		YES	YES			TAPE LOCATION INDICATOR
			AT CARREL & MONITOR	OPTIONAL	NO	NO						PROGRAM NUMBER INDICATOR
		YES	YES	YES	YES	NO	YES		YES		YES	REMOTE VIA TEL. LINE
			YES	YES	NO	YES	YES				YES	JACK FOR STUDENT RECORDER

J C
10/30/67
Revised 4/23/68

RELATED EQUIPMENT

		OMNILAB INC.	ROBERT C. MERCHANT CO.	CHESTER ELECTRONIC LABS.	RCA	RAYTHEON LEARNING SYSTEMS	NORTH ELECTRIC CO.	CONTINUOUS PROGRESS EDUCATION	GENERAL ELECTRONIC LABS.		AMPEX CORP.	RELATED EQUIPMENT
			YES	YES	YES	YES	YES					LINE MONITOR
			YES	YES	YES	NO	YES					EXECUTIVE STATION
		YES	YES	YES	YES	YES		YES				CLASSROOM CONSOLE UNITS
		YES	YES	YES	NO	YES		YES	YES		YES	AUTO. TESTING PROGRAM
						NO					N.A.	AUDIO DUPLICATING SYSTEM
		3-3/4 & 7-1/2	3.75, 7.5 or 15 ips	3 3/4-7 1/2-15	7½, 15			$3\frac{3}{4}$ 7½	3-3/4,7 1/2 OR 30 ips			RECORDING SPEED
			1 THRU 11	6	UP TO 8			1,2 OR 5	2 OR 1 WITH MULTI DRIVE			NO.OF MACHINES/UNIT
			10 OR 16	4	10			17	1 OR 4			NO. OF INPUTS TO SELECTOR
			4	4	10			16				NO. OF OUTPUTS TO TAPE
			METER & PHONES	METER SIMULTANEOUS MONITORING	METER,LIVE	METER		METER; LIVE	METER, OFF TAPE			TYPE OF MONITORING
			4-WITH IND.ERASE	7	4	4		4	1 or 4			NO.OF SIMULTANEOUS TRACKS
					NONE	NONE					N.A.	RANDOM ACCESS TAPE SEGMENT CONTROL
			99	30				99				MAX. NO. OF SEGMENTS
			DAIL OR DIGITAL	DIAL OR TOUCH TONE				DIAL OR DIGITAL SETTING				HOW SELECTED
			OPTICAL OR ELECTRO-MAGNETIC	ELECTRONIC				ELECTRO-MAGNETIC				TYPE OF CUE
			YES	YES				YES				ERASE OR INSERT CUE
			YES	YES				YES				SENSE CUE WHILE RECORDING
			YES	YES				YES				INSERT CUE WHILE PLAYING
			YES	YES				YES				COMPLETE TAPE CONTROL
			DIAL OR DIGITAL	NA				DIAL OR DIGITAL SETTING				TRACK SELECTION BY
			YES	YES				YES				AUTO REWIND TO START OF SEGMENT
			YES	YES				YES				INTERRUPT TO REWIND OR PLAY
												OTHER EQUIPMENT
			SPECIAL ORDER	NO	YES	YES		YES				MOBILE TV STUDIO
			PARTIAL	YES	YES	YES		YES				GROUP PRESENTATION SYSTEMS
			YES	OPTIONAL	YES	NO	YES					STATUS DISPLAY BOARD
			SPECIAL ORDER	NO	YES	NO		YES				COLUMN SPEAKER-AMPLIFIER
				NO	YES	NO					YES	DIAGNOSTIC FACILITY
			YES	YES	YES	NO			YES			AUDIO TESTING EQPT.
							YES					STATISTICAL ANALYSIS PRINTOUT ON TELETYPE

10/28/67
Revised 4/23/68

APPENDIX E - GLOSSARY*

ACCESS, RANDOM

Process of obtaining desired information from a storage device (computer, slide projector, dial access system) at any time and with equal facility.

ACCESS LINES

Wires connecting the student location (carrels and classrooms) to the program switching equipment.

AUDIO MASTER TAPE TRANSPORT

Equipment used to play back audio information on magnetic tape; or in conjunction with other equipment to record audio information on magnetic tape. Transports are normally, but not necessarily, at a remote location.

AUDIO SOURCE

A device used to play back audio programs stored on tapes or discs.

AUDIO SWITCHING EQUIPMENT

Electronic or electro-mechanical equipment used to channel audio programs from audio sources to receiving locations.

AUDIO SYSTEM PROCESSOR

The equipment, sometimes including a computer, which controls the operation of the audio switching equipment. It may also be used to keep track of program usage, number of calls from each receiving location, etc.

---

* Terms cited in this glossary may have other meanings in other disciplines. The definitions given here are more applicable to a dial access system.

AUDIO SYSTEM SPECIFICATION

A document describing technical characteristics of all components in an audio system (sound transducers; transmission equipment; recording and playback devices; switching and control mechanisms, etc.), both singly, and when connected to form an audio system.

AUDIO-VISUAL COMMUNICATIONS

Any learning experience involving both sight and sound, based on that branch of educational theory and practice concerned primarily with the design and use of messages which control the learning process. The goal is the efficient utilization of every method and medium of communication which can contribute toward developing the full potential of the learner.

AUDIO-VISUAL INSTRUCTION

Instruction supplemented by or carried out in conjunction with audio and/or visual aids.

AUTO-TUTORIAL (OR AUTO-INSTRUCTIONAL) DEVICES

Equipment and/or materials designed for self-instruction. Synonymous with programed learning, automated teaching, teaching machine.

AUTOMATIC CUEING OF TAPE SEGMENT

A process whereby a selected portion of a tape is located and made ready for playback.

BEHAVIORAL OBJECTIVE

An instructional objective stated in terms of measurable behavior; a statement that specifies what the learner will be able to do when instruction ends.

BIBLIOGRAPHIC CONTROL

A means for recording and cataloging materials for quick reference to what is available in the various subject areas.

BOOTH

See STUDY CARREL.

BUFFER

A temporary storage device. In dial access it refers to a tape unit which receives a program from a master tape, and then is under the control of the student for playback, student record, etc.

CAPSTAN

The shaft connected to the drive motor of a tape recorder. When recorder is in playback or record mode, the capstan presses the tape against the capstan drive roller, to accurately control the speed of the tape past the recording/playback heads.

CAROUSEL

Circular tray for holding slides.

CARREL

See STUDY CARREL.

CASSETTE RECORDER

Compact, solid-state type of recorder utilizing 1/8 inch audio tape in reel-to-reel cartridges.

CCTV - CLOSED CIRCUIT TELEVISION

A television system which limits distribution of an image to those receivers directly connected to the origination point by coaxial cable or microwave link.

CRT

Cathode Ray Tube. The picture tube of a television receiver. (Synonymous with Kinescope)

CHANNEL

(1) A number assigned by the FCC corresponding to the transmission frequency of a television station. (2) Term sometimes used, synonymous with track, in conjunction with tape recorders. (3) Applicable to any multi-programmed distribution system, as a convenient means of designating the transmission paths.

CIRCUIT

A communication link between two or more points.

COAXIAL CABLE

A conductor designed to carry many radio, telephone, and television signals simultaneously, if desired. Technically, it is a central conductor or wire surrounded by some type of insulation over which a wire mesh or tube is placed. The central wire and outside conductor are concentric and serve as the conductors.

COMPRESSED SPEECH

The result of on-going research which is capable of increasing recorded audio many times its original speed without distortion. With a little practice the average student can comprehend speech at twice its normal rate without difficulty.

COMPUTER ASSISTED INSTRUCTION (CAI)

Individualized system of instruction using a computer.

COMPUTER-CONTROLLER

A computer within a remote access system, the primary function of which is to respond to student requests at the carrels or other receiving locations, and effect the proper connections or disconnections of programs.

CONCEPT FILMS OR TAPES

One idea, demonstration, or concept recorded on film or tape, usually running two to six minutes in length.

CONCEPTUAL LEARNING

A highly developed form of learning in which meanings take on generalized understanding.

CONFIGURATION

The manner in which the elements of a learning system are arranged or connected.

CONTINUOUS LOOP

A length of film or recording tape with ends spliced together, and so placed in a cartridge or other containing device that it may play or be projected continually.

CROSSBAR

An electro-mechanical switching device used to connect program sources to receiving stations.

DATAGRAM

Trade name of the North Electric Remote Access System.

DIAL ACCESS

The process of receiving audio and/or visuals dialing the appropriate number. The information is sent, electronically, to the receiving location connected with the dialing device.

DIAL SELECT

Term popularly applied to a remote access system in which the device for selecting programs is a telephone-type dial.

DIALOG

Trade name for remote access system and equipment made or sold by Chester Electronic Laboratories, Inc.

DUAL-TRACK OR TWO-TRACK OR HALF-TRACK TAPE

Two full-length recordings -- one on each half of the tape.

DUBBING

A copy of a tape recording made by recording on one machine what another machine is playing. Sometimes called a duplicate or dupe.

EDEX SYSTEM

Commercial electronic learning system that displays individual and group responses on a teacher's console to multiple choice questions.

EDUCATIONAL SPECIFICATIONS

A description of an identifiable category of educational information which includes information needed, basic source, rationale and time schedule for collection.

EDUCATIONAL TECHNOLOGY

The development of empirically-proven and validated learning processes, instrumented for replication purposes. This involves the systems approach to instructional and learning problems, and is largely an outgrowth of studies in programed instruction and behavioral technology.

ELECTROMAGNET

Device which becomes magnetized when connected to electric current; e.g., the tape recorder head is an electromagnet energized by the current passing through it.

ELECTRONIC LEARNING LABORATORY

Computers, remote access or other electronic devices utilized in the retrieval of previously stored data or programs.

EPIE

Educational Product Information Exchange.

ERASER, BULK

Device for erasing an entire reel of tape in a few seconds. It contains a powerful electromagnet which neutralizes the magnetic patterns on the tape.

ERIC

Educational Resources Information Center. A nationwide information service to disseminate the results of new educational research at nominal cost.

ETV

Educational Television. Generally identified with open-channel, non-profit community broadcasting stations that air programs of information, culture, and education.

EVALUATION

A process or means of assessing the learning effectiveness of instructional materials.

EVR

Electronic Video Recording. A recording of audio-visual material that can be played by a regular television set adapted for its use.

FEEDBACK

A term describing a (communication) occurrence resulting from or contingent upon the student's response.

FILM CHAIN

An arrangement of any combination of film presentation devices (movie projector, slide projector, filmstrip projector) whereby the projected images are directed, through lenses or prisms, to a single TV camera. Similarly, two or more TV cameras, with appropriate monitoring and changeover electronics, would constitute a TV camera chain. Film and camera chains are frequently used together.

FILM LOOP

A limited amount of film joined at each end, allowing a presentation to be run through a projector continuously.

FILMSTRIP

A length of 35mm or 16mm film containing a succession of still pictures intended for projection one at a time in the same way as slides are shown.

FLOW CHART

A graphic display of the logical or chronological flow and interaction of activities leading to the accomplishment of an objective. Synonymous with process chart and flow diagram.

FOUR-TRACK TAPE

Ordinary recording tape that has four separately playable programs across its width.

FRAME

An individual picture in a series of pictures, as in a motion picture film or filmstrip, or programed instructional materials.

HARDWARE

A term used to describe the mechanical, electrical, and electronic elements of a remote access system. A general term that encompasses all physical equipment used in operations of a remote access educational learning laboratory.

HEAD

(Of a tape recorder) Small, ring-shaped electromagnet across which the tape moves to provide the energy which magnetized the iron oxide coating on the tape into special patterns.

INDEPENDENT STUDY

Pursuit of knowledge by the student on his own or on instructional assignment.

INFORMATION RETRIEVAL SYSTEM

A method of cataloging vast amounts of related data so they can be called up any time they are needed, with speed and accuracy. The recovery of desired information or data from a collection of documents or other graphic records.

INPUT

Information or data transferred or to be transferred from an external storage medium into the internal storage of the remote access system.

INSTANT REPLAY

The immediate repetition of selected portions of, or an entire, audio or video program.

INSTRUCTIONAL MATERIALS CENTER

An area providing multi-media materials and equipment basically for independent study.

INSTRUCTIONAL MEDIA

Devices which present a complete body of information, and are largely self-supporting rather than supplementary to the teaching-learning process.

INSTRUCTIONAL RESOURCES

Teaching materials and equipment and the means of implementing their interaction.

INTERFACE

A common boundary between systems or parts of a system, e.g., a typewriter keyboard, movie screen, etc.

ITFS

Instructional Television Fixed Service. The 31 channels in the 2500-2690 megacycle frequency range opened on July 25, 1963, by the Federal Communications Commission for use by educational institutions and school systems.

ITV

Instructional Television; primarily for in-school dissemination.

KINESCOPE

The picture tube of a television receiver (synonymous with Cathode Ray Tube).

LEAD-TIME

The time between the ordering of a piece of equipment and its delivery. More generally, the time between the planning of an activity and its implementation.

LIBRARY, INSTRUCTIONAL MATERIALS CENTER

A function whose responsibility is to systematically collect and acquire information, classify it, store it and, upon demand, retrieve it and assist in adapting it to the use to be made of the information.

LOCAL PROGRAMING AND PRODUCTION

Lesson or program material produced by teachers within school or college for use locally as compared with programs prepared commercially or by some other institution.

LOOP

Normally used in context of "tape loop." A continuous segment of video or audio recording tape, contained in a cartridge or tape bin. The beginning of a program is thus available immediately after the end. (See CONTINUOUS LOOP, FILM LOOP.)

MAGNETIC TAPE

A long, ribbon-like strip of plastic, acetate or mylar material, with an iron oxide coating, on which information is stored in the form of magnetization patterns.

MANUAL OPERATION

(1) Manual placement and activation of programs or materials on the system. An effective means of making available programs of limited use without overburdening the system. (2) The process of manually operating a remote access system after a central control unit, such as the computer, has failed.

MASTER TAPE DRIVES

Video or audio tape units normally used for playing back pre-recorded instructional programs. In most cases they are

MASTER TAPE DRIVES (cont'd)

not under student control except for starting. They may be of reel-to-reel or endless loop cartridge design.

MATCHING TRANSFORMER

A component used to couple two or more electronic devices whose characteristics are such that they should not be connected together directly, or to bring about a desired change in a system's characteristics, such as, converting an unbalanced transmission line to a balanced line or vice versa.

MEDIA

Any and all physical means (including oral and printed communication) of representing the entire set of stimulus conditions required in the instruction of a learner.

MEDIA SPECIALIST

A person with specialized training in and knowledge of instructional media and its utilization.

MICROWAVE

A means of communication utilizing point-to-point transmission of audio or video signals on carrier frequencies above 300 megacycles/sec.

MIXER

Device which permits the combining of two or more input signals at the same time into a recorder or audio system at the level desired.

MODEL

A mathematical or graphic representation of a process, device, program or concept.

MODULAR PLUG-IN

Adjective referring to electronic equipment that is made up of relatively small units, each performing one or several functions, constructed so that they are readily replaceable by simply pulling them out and plugging new ones in.

MODULE

An electronic component made up of relatively small units, each performing one or several functions.

MULTI-MEDIA APPROACH

Methodology based on the principle that a variety of audio-visual media and experiences correlated with other instructional materials, overlap and reinforce the value of each other.

MULTI-MEDIA PROGRAM

A lesson or series of lessons that incorporate and integrate,where appropriate, various media (live, film, slides, tape, etc.).

MULTI-TRACKING PROGRAMING

A programing method employing more than one version or track. Corresponding tracks teach the same objective but presentations vary to accommodate students of different ability levels or degrees of prior knowledge.

OFF-THE-SHELF MATERIALS

Those prepared learning materials available from publishers and producers of educational products.

ONE-TRACK TAPE

Ordinary recording tape that has a single program recorded, utilizing full width of the tape.

OUTPUT

The data, signal or product of any system component.

PARAMETER

A quantity which may have various values, each fixed within the limits of a stated case.

PERCEPTUAL LEARNING

Learning which results from direct contact through the senses.

POSITION

Receiving location; carrel.

POST-TEST

A test given to a student upon completion of a unit of instruction to measure learning achieved.

PRE-TEST

A test given to a student prior to entry into a unit or instruction to determine the technical skills and knowledge he possesses in a given subject.

PROGRAM

(1) Instructional unit or series (can be recorded on tape, film, or presented live). (2) A definable activity of an educational agency; a cluster of related activities. (3) A sequence of carefully constructed

PROGRAM (cont'd)

items leading the student to mastery of a subject with minimal error. Empirical evidence of the effectiveness of each teaching sequence is obtainable from the performance records of students.

PROGRAMMED INSTRUCTION

A curriculum design wherein all relevant methods, techniques, media, and devices are used to carefully sequence the learning unit to insure a successful learning experience.

(Process) The application of a systems design approach to develop a learning system.

PROGRAMMED INSTRUCTIONAL MATERIAL

Instructional material prepared specifically to employ programmed instructional techniques, such as texts, tapes, films and filmstrips, slides, scripts for live presentations, etc.

PROGRAMMED INSTRUCTIONAL SYSTEM

The product resulting from an integrated relationship of all subdivisions of an instructional unit using the principles of programmed instruction; included are, programmed materials, their presentation devices, and the live instructor, all aligned to establish proper functional continuity towards the successful performance of previously defined instructional objectives.

RAIRS

Remote Access Information Retrieval System.

PROGRAM RESOURCE AND CONTROL CENTER

Location of taped instructional materials stored on transports or recorders for electronic transmission to remote carrels or classrooms.

PROGRAM SELECTION DEVICE

Dial, push button, digital dial or other device, located at receiving station, and used to initiate requests for programs.

PROGRAM SOURCE

A device used to play back visual and/or audio programs. Examples: audio tape recorders; video tape recorders; slide projectors; television receivers/converters.

PROGRAMMED TEXT

Printed instructional content that is presented in short steps requiring individual student responses reinforced by immediate reference to correct answers, permitting student to progress at own pace and ability.

PROGRAMMER

One who develops learning sequences to be used in programmed instruction.

RANDOM ACCESS

Electronic retrieval of desired audio or audio-visual programs from many stored programs and available for transmission to remote station.

REAL-TIME

A method of processing data so fast that there is virtually no passage of time between inquiry and result.

RELEASE TIME

Provision of time for teachers within normal work schedule for the preparation and production of materials and taped programs to be used in course presentation.

REMOTE ACCESS

Access to a separate location, utilizing electronic devices for the selection, transmission and presentation of the material.

REMOTE CONTROL

A mechanical and/or electrical installation which makes possible the control, operation, and adjustment of such devices as projectors, cameras, tape recorders, electronic learning labs, audio and video systems in adjacent or remote areas by means of special switches and electrical relays.

REMOTE STATION

A receiving station (carrel, classroom, etc.) located away from the point of program origination.

REPLICATION

The extension of a procedure to a situation similar to that in which it was validated.

RESOURCE PERSON

A person engaged in the planning and utilization of audio-visual media and other instructional materials.

SELECTION DEVICE

Device used by the student to select a program, and could be a dial, push button, digital counter, etc.

SEQUENCING

The ordering of steps or procedures to achieve an objective.

SIGNAL MULTIPLEXER

A device for the mixing of several signals for transmission over a single system. Microwave relays are often multiplexed to carry video and audio signals simultaneously.

SIGNAL WIRES

The wires which carry the electric commands or programs between the several elements of the remote access system.

SOFTWARE

Variety of printed and/or audio-visual materials containing that which is to be learned.

SOLID STATE ELEMENTS

Electronic components using semiconductor devices such as transistors, thermistors, varistors, diodes, etc.

STUDENT-FACULTY CONTACT TIME

The time during which students and faculty are together in a formal instructional setting.

STUDENT POSITION

Individual study carrel or station usually electronically wired to instructional program sources.

STUDENT RECEIVING STATION

Any location where a student may dial and receive an audio or video program, such as carrels, classrooms, dormitories, learning or language laboratories, libraries, etc.

STUDENT RECORDER

Tape recorder used directly by the student. It may be located remotely or at the student station.

STUDENT RESPONSE MODE

The ways in which students may communicate with the equipment, as via microphone, push button, dial, etc.

STUDY CARREL

A small alcove or booth used for independent study, which may contain audio-visual equipment and/or remote access to stored programs.

SUBJECT MATTER SPECIALIST

A person who has thorough knowledge of the material being programmed. He acts as advisor and critic concerning subject matter, during the production of programmed materials.

SWITCHING LOGIC MODULE

A solid state module within a system processor, used to control the switching of programs to and from receiving locations.

SWITCHING MECHANISM

An electrical, electronic, or electromechanical component utilized to connect program sources to receiving locations. (Examples: relays, rotary stepping switches, crossbar switches, crossbar switches, solid state logic modules.)

SWITCHING RELAYS

Electro-mechanical devices used to connect program sources to receiving locations.

SYSTEM

A group of interacting components which operate within defined performance limits and design constraints, while achieving stated objectives.

SYSTEMS APPROACH

An integrated, programmed complex of instructional media, machinery, and personnel whose components are structured as a single unit with a schedule of time and sequential phasing. Its purpose is to insure that the components of the organic whole will be available with the proper characteristics at the proper time to contribute to the total system, and in so doing to fulfill the goals which have been established.

SYSTEMS DESIGN

An organized method of achieving specified objectives which considers the effect of each part on the whole and which uses evidence of effectiveness of the parts to modify them until the objectives are achieved.

SYSTEMS ENGINEER

One who studies problems in industry, science, business, and government, and then organizes electronic data processing techniques and machine systems to solve them. He works at the source and with management in the organization concerned.

TAPE

A strip of material which may be punched, coated, or impregnated with magnetic or optically sensitive substances and used for data input, storage, or output. The data are stored serially in several channels across the tape transversely to the reading or writing motion.

TAPE CARTRIDGE

Magazine or hard plastic case containing a reel or two of tape which is placed on a recorder without threading. Reel-to-reel cartridges allow the tape movement to be controlled in either direction. Endless-loop or continuous loop cartridges can continue to play indefinitely but do not permit rewinding at will.

TAPE CLIPS

Short tape segments.

TAPE DRIVE UNIT

(1) The mechanism used to transport the audio or video tape across the playback and recording heads. The tape may proceed from reel-to-reel, or be contained within a continuous loop cartridge.

TAPE HEAD

The element of a tape unit which is used to place information on, or take information from, the tape as it passes by.

TAPE RECORDER

A tape unit, sometimes called a recorder/reproducer, which can record and play back. It contains recording and playback amplifiers and heads. The heads may be full-track, half-track, dual-track, or quarter-track.

TAPE SPEED

Speed at which taped programs are recorded or played back. The most common speeds are:
audio, 3-3/4, 7-1/2 inches/second;
video, 15 inches/second.

TAPE SPILLOVER

A situation wherein tape leaves the normal reel-to-reel path causing excess slack, loops or entanglements, usually caused by faulty braking of the feed reel.

TAPE SPLICE

Joining of two tape segments by a gluing or taping process.

TAPE TEACHING

The utilization of tapes (video and/or audio) as a primary means of instruction.

TAPE TRANSPORT

Also called a tape deck or tape drive, it is the mechanism which moves the tape past the heads. It includes head assembly, motor, and controls for tape movement. The term does not normally refer to the electronic components which together with the transport mechanism constitute a tape recorder.

TASK ANALYSIS

Analysis of learning objectives to identify classes of behavior involved in achieving objectives to determine the stimulus and response characteristics of those behaviors.

TEACHING MACHINE

An auto-instructional device designed to present a program of instruction without the aid of a live instructor.

TEACHING STRATEGY

The combination of methods and media and materials to achieve specific learning objectives for a specific subject population.

TECHNICAL SPECIFICATIONS

Functional characteristics of equipment.

TECHNOLOGY

(1) A systematic body of facts and principles related to a comprehensive, practical and useful end. The term is not limited to industry or to engineering. The principles of effective teaching (pedagogy) comprise a technology.

TERMINAL BEHAVIOR

The behavior desired of a student when he completes a course of instruction.

32-TRACK TAPE

Recording tape that has 32 separately playable programs across its width (inch size required).

TRADE-OFFS

A general term referring to the need to sacrifice fulfillment of one demand so as to satisfy another more adequately. A common example is the trade-off between low cost and quality material or performance.

TRANSISTORS

Tiny elements in an electronic circuit that do much the same job as a vacuum tube. They are highly efficient and reliable and generate little heat.

TRANSISTORIZED

Utilizing transistors and other solid state components.

TRANSMISSION

The passage of a program or signal from one point to another, using cable or air waves.

TRANSPARENCY

A sheet of transparent material, which may have text written on it or burned into it, and is used in conjunction with an overhead projector.

TV TUNER

The device employed in TV receivers to select a single TV signal or program.

2500MH_z (MEGAHERTZ)

Carrier frequency of instructional television fixed service broadcasts (see ITFS).

TWO-TRACK

A process whereby two programs can be put side by side on the same tape and played separately.

VALIDATED LEARNING MATERIALS

Materials which have been proven to achieve specified instructional objectives with a specific target population.

VALIDATION

Procedure of testing and revising a teaching system strategy, or component parts, until objectives have been achieved.

VIDEO MONITOR

A device for displaying visual images that differs from a TV receiver in that it has no channel selector or audio output. It must receive its signal via cable without a carrier signal and is capable of

VIDEO MONITOR (cont'd)

greater clarity and resolution (resulting in a higher quality image).

VIDEO SWITCHING EQUIPMENT

Equipment used to channel the appropriate video program to the student making the request.

VIDEO TAPE DRIVE

Equipment used to play back visual information from magnetic tape and/or in conjunction with other equipment to record visual information on magnetic tape.

VIDEO TAPE RECORDER (VTR)

A device, utilizing magnetic tape, to record visual images in conjunction with television equipment.

VIDEOTAPES

Magnetic tape on which visual images and sounds are recorded.

VISUAL MATERIALS

Those instructional materials which communicate primarily through sight: written and printed materials, projected pictures, charts, maps, objects, specimens, and the like.

VOLUME LEVEL

Degree of loudness.

VTR TAPES

Tapes used with video tape recorders.

APPENDIX F

SELECTED READINGS ON THE DIAL ACCESS INFORMATION RETRIEVAL SYSTEMS

Anderson, Roland A. "Let's Look at the Instructional Systems Approach," *Business Education World*, (February 1967), 19-20 and 44.

Arnoff, Mary S. "Nova's Dial Access Retrieval System," *Audiovisual Instruction*, XII, No. 5 (May 1967), 470-71.

"Audio-Visual Communications: Trends and Possibilities," *Architectural Record*, (February 1967), 167-70.

Becker, Joseph. "Communications Networks for Libraries," *Wilson Library Bulletin*, (October 1966), 382-87.

Behrens, John H., and Harmon Bud G. "Economical and Efficient Auto-tutorial References," *Audiovisual Instruction*, XII, No. 5 (May 1967).

"Beverly Hills Schools' Experimental Information Retrieval System," *Audiovisual Instruction*, XII, No. 5 (May 1967), 478-79.

Biemesderfer, William E. "Ohio State University's DATAGRAM," *Audiovisual Instruction*, XII, No. 5 (May 1967), 458-59.

Blumenfield, Catherine, and Jordan, Robert T. "*The Federal City College Media Center: A Plan for Active Service*," *Library-College Journal*, I, No. 2 (Spring 1968), 31-39.

Briggs, Leslie J., Campeau, Peggie L., Gagne, Robert M., and May, Mark A. *Instructional Media: A Procedure for the Design of Multi-Media Instruction*. Pittsburgh: American Institute for Research, 1967.

Brish, William M. "Five Years with Television Instruction," *Report on Washington County Schools* Closed-Circuit Television, Hagerstown, Maryland. 1964.

Burns, J.L. "Changing Directions in American Education," *Saturday Review*, January 14, 1967.

Bushnell, Don D. (ed.) "Information Retrieval Systems and Education," *The Automation of School Information Systems*. Washington: Department of Audio-visual Instruction, National Education Association, 1964.

Bushnell, Don D. and Allen, Dwight W. *The Computer in American Education*. New York: John Wiley and Sons, Inc., 1967.

Canfield, Albert A. "*The Oakland Community College Instructional Approach*. A Report by the College, Bloomfield Hills, Michigan, 1966.

"Chabot College," *Pioneer*, XXVIII, No. 4 (Winter 1967).

Crossman, David M. "New Learning Techniques Via Audio-Visual Media," *American School and University*, XXXVIII, No. 9 (May 1966), 115-16.

deBernardis, Amo. "To Carrel or Not to Carrel? That Is the Question," *Audio-visual Instruction*, (May 1967), 478-79.

"Dial Information for Learning," *Inside Wayne* (Wayne University, Detroit), XXIX, No. 4 (October 1967).

"The Education Industries," *Harvard Educational Review*, XXXVII, No. 1 (1967).

Egan, Mary J. "Tiptoe in Technology," *School Library Journal* (April 15, 1967), 49-51.

"Electronic Learning Center," *Catholic School Journal* (May 1966), 32-33.

Erickson, Carlton W.H. *Fundamentals of Teaching with Audiovisual Technology*. New York: Macmillan, 1965.

Fine, Benjamin. "Education: Big Impact of Technology," *Baltimore Sun*, August 27, 1967, sec. 4-23.

Fogarty, John. "Revolution in Our Schools," *School Library Journal* (January 15, 1967), 34-35.

Gerard, Ralph W. (ed.) *Computers in Education*. New York: McGraw Hill, 1967.

Godfrey, Eleanor P. *The State of Audiovisual Technology: 1961-66*. *Monograph No. 3*. Washington: The Bureau of Social Science Research, Inc., 1967.

Green, Alan C. (ed.) *Educational Facilities with New Media*. Washington: Department of Audiovisual Instruction, National Education Association.

"Happiness Is Your Own Carrel," *Time* (February 18, 1966), 60.

Hartjen, Raymond. "Is Dial Access of Stored Audio a Behaviorally Sound Student Interface?" *Educational Communications*. Pittsburgh: University of Pittsburgh, April 14, 1967. (Master's Paper, 22 pp.)

Hayes, Alfred S. *Language Laboratory Facilities*: Technical Guide for Selection, Purchase, Use and Maintenance. Washington: U.S. Department of Health, Education, and Welfare (Bulletin 1963, No. 37; OE-21024).

Herbert, Evan. "A Special Report on Technology for Education," *International Science and Technology* (August 1967), 28-49.

Hocking, Elton. *Language Laboratory and Language* Learning. 2nd edition; Monograph No. 2. Washington: Department of Audiovisual, National Education Association, 1967.

Hoppes, W. J. "Student and Community Aid Center," *Audiovisual Instruction* (March 1967), 270.

Horsman, Donald. "The Implications of Dial-Access Systems in Continuing Education," *American Society of Clinical Pathologists*. Chicago: Commission on Continuing Education. 7 pp.

Howe II, Harold. "Realities of the Learning Market," *School Library Journal* (January 16, 1967), 29-33.

Jordan, Robert T. "Libraries of the Future for the Liberal Arts College," *Library Journal* (February 1, 1967), 537-39.

Krail, Jack B. "The Audio Laboratories at Virginia State College (Norfolk Division," *Audiovisual Instruction*, XII, No. 5 (May 1967), 460-63.

Lalime, Arthur W. "Tape Teaching," *Audiovisual Instruction*, XII, No. 5 (May 1967), 453-58.

________. "Tape Teaching: Dial Select or Auto Library?" *Audiovisual Instruction*, XII, No. 5 (May 1967), 441.

"Learning by the Dial System," *The Hartford (Conn.) Courant*, December 2, 1962, p. 7.

Lewis, Phillip. "How to Buy and Use Learning Laboratories," *Nation's Schools*, LXXVII, No. 5 (May 1966), 106-10.

Lewis, William C. *Through Cable to Classroom: A Guide to ITV Distribution Systems*. Washington: Department of Audiovisual Instruction, National Education Association, 1967.

Lieberman, Myron. "Big Business, Technology, and Education," *Phi Delta Kappan* (January 1967), (January 1967), 185-86.

Mahoney, Tom. "New Tools for Education," *Bell Telephone Magazine* (May/June 1967).

Marke, Julius J. *Copyright and Intellectual Property*. New York: Fund for the Advancement of Education, January 1967.

McClendon, Paul I. "Oral Roberts University's Dial Access Audio-Video System," *Audiovisual Instruction*, XII, No. 5 (May 1967), 464-66.

McConeghy, Gary Lynn. "An Analysis of Certain Time and Measures Involved in the Integration of Systems for Individualized Electronic Instruction," Wayne University. (Doctoral Dissertation, 1966.)

McKeegan, Hugh F., and Moore, J. William. "Mediating Individualized Instruction at Bucknell," Audiovisual Instruction, XII, No. 5 (May 1967), 467-68.

Meier, Milton. "Tape Recorders and Learning Center: A College Searches for New Keys," The National Observer, February 14, 1966.

Messick, John D. "Learning Resources Center is Built Around Instruction," College and University Business School Review, November 1965.

Morris, Barry. "The Function of the Media in the Public Schools," Audiovisual Instruction, January 1963.

National Education Association. Highlights of Schools Using Educational Media. A Department of Audiovisual Instruction Media Survey. Washington: National Education Association, 1967.

"New Yale Facility Gives Student 20 Languages at His Fingertips," The New Haven Register, April 14, 1963.

North, R. Stafford. A Demonstration of the Impact of Certain Instructional Changes on the Attitudes and Practices of Both Students and Faculty. Final Report on Project No. BR 5-1002 to U.S. Office of Education, Bureau of Research, September 1967.

________. "Learning Center Gives Each Student a Study Carrel: Tapes Let Students Dial a Lesson," College and University Business, May 1967.

________. "Oklahoma Christian College's Dial Access Retrieval System," Audiovisual Instruction, XII, No. 5 (May 1967), 468-69.

________. "Personalization by Mechanization," The Tennessee Teacher (September 1966), 14-17.

"Open Secret at Oakland," Data Process, X, No. 3 (September 1967), 10-13.

Phipps, John L. Project AIRDALE: Automated Information Retrieval Dial-Access Learning Environment. Proposed Project, Instructional Technology Branch, Headquarters, USAF, Washington, D.C. 30 pp.

Ramey, Carl R. A Copyright Labyrinth: Information Storage and Retrieval Systems. New York: American Society of Composers, Authors and Publishers, 1968.

Reid, J. Christopher, and MacLennan, Donald W. Research in Instructional Television and Film. Published by the Bureau of Research, Office of Education, U.S. Department of Health, Education, and Welfare, Washington, D.C., 1967.

Rossi, Peter H., and Biddle, Bruce J. The New Media and Education: Their Impact on Society. Chicago: Aldine Publishing Company (1966), 74-80.

Schwilk, Gene L. "Oak Park's Title III Project," School Library Journal (January 15, 1967), 38-42.

Singer, Ira J. "The Dial Select Story - West Hartford, Connecticut," Audiovisual Instruction, XII, No. 5 (May 1967), 446-49.

Skornia, Harry J. "What We Know from New Media Research," NAEB Journal, XXV, No. 2 (May/April 1966), 26-37.

Sobol, Thomas. "How We Planned Our Dial Access System," Nation's Schools, XLXXVIII, No. 4 (October 1966), 74-77.

"Space for Individual Learning," Educational Executives Overview, IV, No. 3 (March 1963), 29-40.

Spear, James. Creating Visuals for TV. Washington: National Education Association, Division of Audiovisual Instructional Service.

Stewart, Donald K. (ed.) Dial Access Information Retrieval Systems for Education: Newsletter. Westminster, California: SLATE Services (Issues 1965-68).

________. "The Cost Analysis of Dial Access Information Retrieval Systems," Audiovisual Instruction, XII, No. 5 (May 1967), 43-44 and 492-94.

"Tape City," Visual Communications Instructor, II, No. 10 (December 1967).

Taras, A.F. "Ithaca College's Audio-Laboratory Center," Audiovisual Instruction, XII, No. 5 (May 1967), 478.

Taylor, Stanford E. What Research Says to the Teacher: Listening. Washington: American Educational Research Association of the National Education Association. Reprinted August 1966.

"Technology in Education," Education U.S.A. Special Report, National Education Association, Division of Press, Radio and Television Relations (1967) 24 pp.

Theuma, Jean R. "Is Dial Access a Fad?" Audiovisual Instruction (September 1967).

Travers, Robert M.W. Research and Theory Related to Audiovisual Information Transmission. Report, Contract No. 3-20-003, U.S. Department of Health, Education, and Welfare, Office of Education. Revised Edition 1967.

Underwood, David. "Creativity in Instruction," Audiovisual Instruction (September 1967), 680-82.

"University Students Dial Lessons in Study of Languages," Waterbury American (February 26, 1964).

Weier, Bruce E. Installation Completed! Now What? (A System of Learning Laboratory Management). Charleston, Illinois: Eastern Illinois University. (Author's Copyright, 1967).

________. Program Development and Scheduling for Random Access Systems. Charleston, Illinois: Eastern Illinois University. (Author's Copyright, 1967).

Wigren, Harold E. "Some Things I Have Learned about Television in the Classroom" View, II, No. 3 (June 1966), 24-26.

Wisniewski, Ray. "Grand Valley State College's Dial Access Retrieval System," Audiovisual Instruction (May 1967).

Wittich, Walter Arno. "What ETV Research Has Taught," Nation's Schools, LXXVI, No. 4 (October 1965), 45-72.

Wittich, Walter Arno, and Schuller, Charles Francis. Audiovisual Materials: Their Nature and Use. New York: Harper & Row, 4th Edition, 1967.

Br 7-1042
Pa 56

Collateral Report on
Guidelines Handbook for Educators
Project No. BR 7-1042
Contract No. OE-1-7-071-42-5093

STATE OF THE ART STUDY
OF
DIAL ACCESS INFORMATION RETRIEVAL SYSTEMS

July, 1968

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

State of the Art Study of Dial Access Information Retrieval Systems

Collateral Report on
Guidelines Handbook for Educators
Project No. BR 7-1042
Contract No. OE-1-7-071042-5093

Dr. Gabriel D. Ofiesh,
Principal Investigator

July, 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Eudcation, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

The Catholic University of America
Center for Educational Technology
Washington, D.C. 20017

CONTENTS

I. Introduction. 1

II. Method and Procedure. 4

III. Project Results 7

IV. Conclusions and Recommendations 11

I. INTRODUCTION

Rationale. The rapid emergence of dial access systems in the past few years would appear to offer educators an opportunity to deal more efficiently with:

1. The logistical problems of scheduling and distributing all types of audio and audiovisual instructional materials and equipment to the study carrel and classroom.

2. The information explosion which keeps multiplying the product causing prohibitive storage and use problems.

3. The thrust of education to individualize instruction with its independent study programs, and

4. The student explosion problem with the lack of qualified teachers to lower the students-to-teacher ratio.

If it's possible to tie the concept of instructional systems into the electronic distribution system of dial access, we may well be on the verge of a breakthrough in using our instructional tools to effective advantage in new ways. "If we can move from the use of media as atomistic, tacked-on aids to their use in integrated systems distributed electronically to individual students, classrooms, multi-institutions, homes, and factories, media may yet make education into an entirely new enterprise."[1]

Until the present study was undertaken, there was no experienced procedure for the development of dial access systems except perhaps by industry, whose advice to administrative decision-makers is not always in the latter's best educational interests. Unfortunately, therefore, the lack of expertise and proper guidelines for the planning, purchase, and utilization of this new technology has provided problems for many pioneering in the field.

It is hoped that this study and the resulting handbook will provide an initial solid contribution to the impartial assessment and healthy development of the dial access technology in meeting educational goals.

---

[1] Dr. Anna L. Hyer. "From A to S," Audiovisual Instruction, (Editorial) May 1967.

While the Advisory Committee (including Drs. Anna L. Hyer, Wesley Meierhenry, C. Ray Carpenter) assisted us in sharpening our focus on the whole study, the following basic questions were considered in reviewing the literature and evaluating existing dial access systems in our terminal objective of producing a guidelines handbook for educators:

1. What is the state of the art in terms of the following data:
    - a) Number of facilities operating and planning.
    - b) Specific locations and geographical spread.
    - c) Distribution along academic levels.
    - d) Size and capability: number of audio and/or audio-video student and classroom receiving stations.
    - e) Costs and financing.
    - f) Number of subject disciplines involved.
    - g) Nature of use: review, supplemental, enrichment, remedial, prime.
    - h) Amount of use.
    - i) Ways of use in different subject areas.
    - j) Evaluation and research studies on-going.
    - k) Location of student carrels.
    - l) Expansion versus no-expansion plans.
2. What has been the historical development of dial access.
3. What are the attitudes of students and faculty towards acceptance and use of the system.
4. What methods, techniques, and incentives are required to establish positive attitudes towards use among students and faculty.

5. What educational objectives and rationale are being considered by institutions in deciding upon the installation of a dial access system.

6. What are the methods and sources used in developing the software.

7. How are the system's specifications determined.

8. What are the practical considerations in selecting the system's equipment.

9. Who are the suppliers and manufacturers.

10. What are the installation and operational concerns and problems.

11. What are the orderly steps in a successful decision-path for administrators.

12. What research is there to show the educational effectiveness of the system's use.

13. What are the prerequisites to successfully planning the installation of a system.

14. What do administrators, faculty, and students foresee in the future of dial access as an instructional technology.

II. METHOD AND PROCEDURE

The project was officially initiated with a planning session on September 15, 1967, composed of authorities in education serving as consultants. Participants in this meeting included Dr. Robert Snider of DAVI, Dr. Robert Smith of HUMRRO (George Washington University), Dr. Donald Stewart of SLATE Services, Lt. Col. John Phipps of the Army Instructional Technology Division, Dr. Priscilla Ransohoff of the Electronics Command, Ft. Monmouth; Dr. Adolph Koenig of the Office of Education was present to critique suggestions in light of the government's objectives for the study project.

The months following were devoted by the staff (see Fig.1) to crystallizing the project plans, searching the literature, seeking out and identifying the users, preparing and sending out a questionnaire, selecting and visiting a cross-section of operating installations, collecting and analyzing the data, conducting a three-day Institute, and finally the writing and publication of the Handbook.

On January 10, 1968, the Advisory Committee (Dr. Anna L. Hyer of DAVI, Dr. Wesley Meierhenry of the University of Nebraska, and Dr. C. Ray Carpenter of Pennsylvania State University) met with the staff to assess the progress and plans and to make recommendations for carrying out the project to completion.

Along with the literature search, our early efforts were concentrated on identifying the institutions which were using or planning to install dial access systems. This information came mainly from the following sources:

Title III grants, Elementary and Secondary Schools Act.

Title VI grants, Higher Education Act.

Suppliers' and Manufacturers' lists.

Higher Education Media Survey (NEA, 1967).

Schools Using Educational Media (DAVI, 1968).

DAVI Seminars (2) on Dial Access Systems (Sept-Nov. 1967).

Survey of Instructional Closed-Circuit Television (DAVI, 1967).

Literature Search.

Donald Stewart's Dial Access User Survey.

The questionnaire was designed and constructed to elicit basic information and data on existing systems, and to include items that could be verified in structured interviews for on-site visits. It was also to serve as a means for selecting institutions to visit on the basis of established criteria.

The criteria for choosing the ten schools and colleges for in-depth studies were based on the following:

- Operational for one year
- Representative academic levels
- Small and large facilities
- Geographical distribution
- Audio and audio-video capabilities
- Successful and unsuccessful operations

Because of the relatively short period of time that these systems have been in operation, it was unfair to designate any broad categories as adoptors and rejectors; also, pioneers of any new technology are bound to have their discouraging problems, often incurred by poor advice. The less than successful operations were identified by weighted data from the questionnaire, lack of any plans, and personal assessments of consultants and authoritative contacts.

The institutions visited during January and February 1968 included:

1. Grand Valley State College, Allendale, Michigan
2. Ohio State University, Columbus, Ohio
3. Oklahoma Christian College, Oklahoma City, Okla.
4. Oral Roberts University, Tulsa, Oklahoma
5. St. Louis Junior College District (3), St.Louis, Mo.

6. University of Hartford, Hartford, Connecticut
7. Oakland Community College, Bloomfield Hills, Mich.
8. Beverly Hills Unified School District, Beverly Hills, California
9. Alexis I. DuPont Special School District, Greenville, Delaware
10. Las Vegas Public School District, Las Vegas, Nevada
11. West Hartford Public Schools, West Hartford, Conn.

Oakland Community College was added to our list of ten, as an institution with a systems approach to education which had elected the direct library access of audiovisual materials over electronic distribution through dial access, and in that sense was considered a potential rejector.

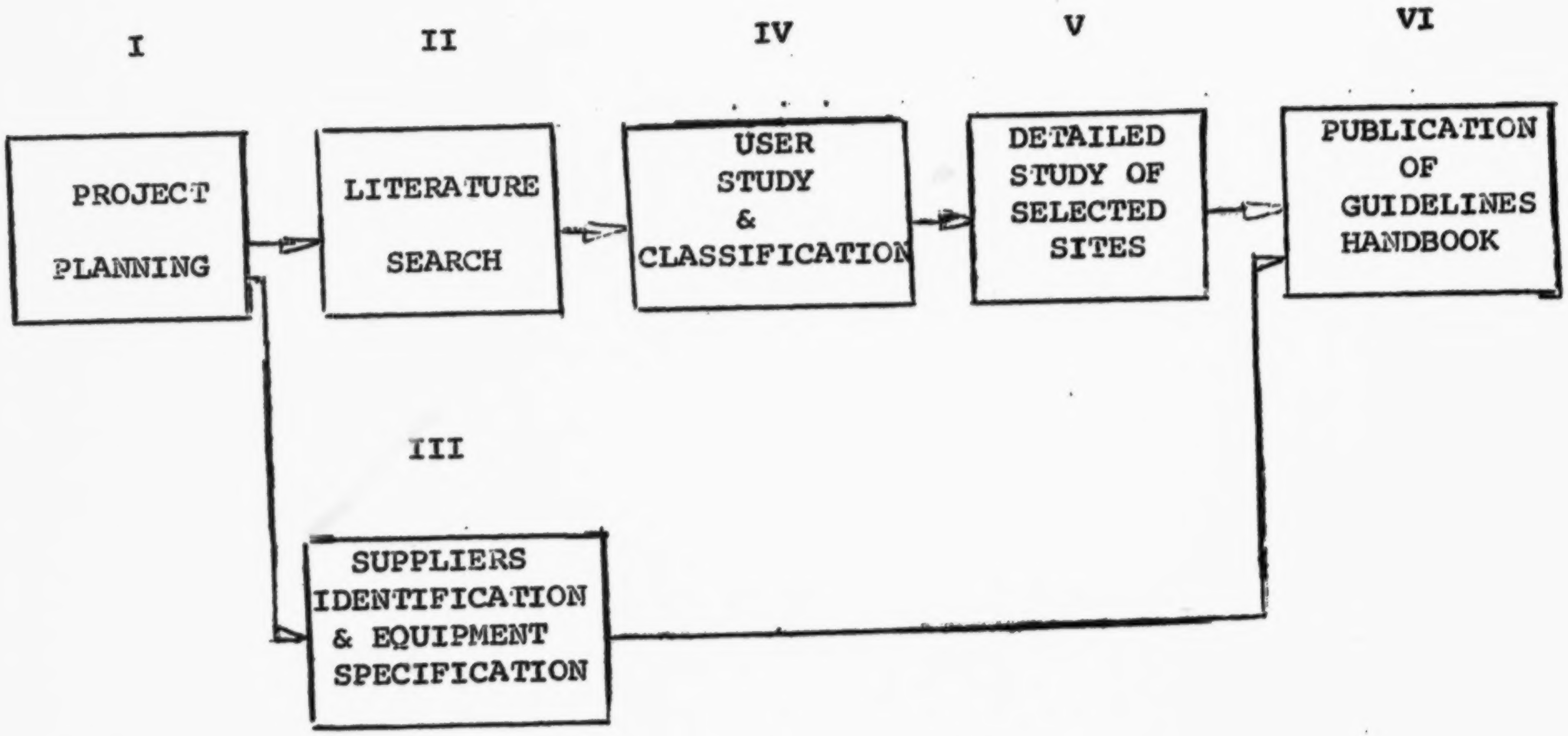
The interview instrument was structured for administrators, faculty, students, and technical personnel. A Semantic Differential Scale was included to measure attitudes. The subjects were asked to rate media on ten bi-polar scales, selected from Osgood, Suci, and Tannenbaum (1957) for their high saturations on the evaluative factor. The survey instrument was reinforced by selected personal interviews, the content of which were recorded by notes or on audio tapes.

An Institute was held in May, 1968 (postponed from April due to civil disturbances in Washington at the time), in order to provide a run-through of the information and data developed, and to receive in return feedback and validation for the final Handbook inputs. Dr. R. Stafford North of Oklahoma Christian College and Dr. Paul Pimsleur of Ohio State University were among those who participated in the conduct of the three-day sessions. There were 75 attendees representing a wide sampling of interest in dial access systems. Personal comments and letters on the valuable contributions of the Institute led to the formulation of plans for future conferences.

Writing of the Handbook was undertaken after the mass of data amd reports were assimilated and diagnosed. It is planned that a preliminary distribution limited to those actively interested in the field will provide a substantive, random sampling of feedback to validate a permanent published edition in the near future.

DIAL ACCESS INFORMATION RETRIEVAL SYSTEMS

STATE OF THE ART STUDY


I
PROJECT PLANNING
II
LITERATURE SEARCH
IV
USER STUDY & CLASSIFICATION
V
DETAILED STUDY OF SELECTED SITES
VI
PUBLICATION OF GUIDELINES HANDBOOK
III
SUPPLIERS IDENTIFICATION & EQUIPMENT SPECIFICATION

PROJECT FLOW CHART

Figure 1.

III. PROJECT RESULTS

In substance, the results of the Study are to be found in the Guidelines Handbook. Only a brief summary of some of the data and findings, therefore, will be presented here.

Much of the information derived from the literature search provided only descriptive studies of new systems in operation. The articles were generally written by individuals identified with a system. The paucity of pertinent literature in very meaningful terms may be indicative of the rapid emergence of dial access systems within the past several years and the short period of operation that most users have had to evaluate and assess results, no less undertake research.

The 300 questionnaires sent out to institutions, identified as having a dial access system, produced the following salient data:

121	Installations in operation (43, language-only)
56	Planning to install a system
200	Estimated overall operating systems with 1/3 for languages only
6 - 857	Range in number of audio receiving stations
25	Median no. of audio receiving stations in Elementary/Secondary schools
35	Median no. audio receiving stations in Junior Colleges
45	Median no. audio receiving stations in Colleges/Universities
6	Elem/Sec schools with video facilities
5	Colleges/Universities with video facilities
1	Junior College with video facilities
4 - 85	Range in number of video receiving stations
18	Median no. of video receiving stations

88% Non-sectarian; 66% public; 0% phasing out system

35% Planning immediate or long range expansion

26% Not planning expansion

4% Actively engaged in research

25% Actively conducting some type of evaluation

43% Located in Elementary/Secondary schools

10% Located in Junior Colleges

48% Located Colleges/Universities

- $10,000 up Cost of Initial installation
- $35,000 Median cost of facility in Elem/Sec Schools
- 35,000 Median cost of facility in Junior Colleges
- 55,000 Median cost of facility in Colleges/Univ.
- 25% Spent less than $20,000 initially
- 25% Spent more than $80,000 initially
- 25% With less than 20 receiving stations
- 25% With more than 60 receiving stations
- 30% With only one subject available on system
- 39% With 2 - 4 subjects
- 28% With 4 - 8 subjects
- 3% With 9 or more subjects
- 45% Use system for enrichment
- 45% Use system for teacher-mediated instruction
- 10% Usage for review, remedial, prime presentation of course content

Interviews and questionnaires at the sites visited provided an in-depth study and validation of information derived from the general survey. As shown in Appendix D of the Handbook, positive attitudes were expressed towards dial access by both students and faculty alike. This was further substantiated by the Semantic Differential Attitude Inventory which covered 12 types of media on 10 bi-polar scales. Of 83 faculty responding to a question on attitude, 75 recommended dial access as an effective instructional technology. Among 469 students responding, 427 stated they liked dial access as against 42 who were opposed. A total of 420 students expressed a preference to use it more while 75 answered in the negative.

These results would indicate little doubt as to the acceptance of dial access and its potential. However, positive attitude is not necessarily equated with positive utilization. Interviews with faculty and administrators support the following considerations or prerequisites important to the successful implementation of a dial access system:

- Administration/faculty/student involvement, participation, and commitment
  Planning Committees should exist from the start.
  Putting the system in first and then trying to get the faculty to support it is not recommended.
  Student acceptance will depend on faculty attitudes.

- Administrative leadership
  Key role is played by the person in charge of implementing the program.
  He must have enthusiastic commitment with authority to insure its success.
  Professional rapport and communication with faculty is necessary to get results.

- Priority of educational objectives
  The electronic equipment should serve the instructional program.
  The program should not be designed around the equipment.
  Avoid interpreting educational progress in terms of the latest instructional technology installed irrespective of use or learning effectiveness.

- Flexibility for expansion and development
  System should be designed to allow for expansion and future developments. Program should grow in step-by-step manner as materials are developed and used.

- Lead-time essential

  Start with adequate program material.
  Avoid having hardware ready before software is availabl
  Psychologically defeating to have new equipment around not being used.

- Incentives for teachers

  In order to encourage and motivate teachers to acquire and produce materials for the system, provide:
  - Release time from teaching duties
  - Compensate for summer work
  - Funds for travel and research
  - Workshops with staff and invited authorities.

- Orientation to system's operation and use

  Teachers must know how the system operates technically.
  Teachers must be kept informed on effective uses of the system in their subject areas.

- Acquisition and production of instructional tapes

  Software is the key to any successful operation.
  Ease and convenience in preparing and producing materials increases faculty use.
  Therefore, provide competent technical assistance in making tapes, graphics, etc.
  Give faculty latitude and assistance in the selection and development of materials.
  Ready access to available material through efficient cataloguing helps utilization.

- Need for expert technical consultant

  Technical specifications must be designed to meet educational objectives.

- Availability of competent technical service

  Prompt and dependable service is a must.

From the literature, interviews, and free response items on questionnaires, a major contribution of the dial access system would appear to be in forcing the teacher to re-think and restructure his pattern of presenting course materials, to reassess the use of time for class and independent study, and the appraisal of his own instructional product which he now can see and hear in playback. In a very direct sense, then, the dial access technology has the potential to provide a bridge for transition to new concepts of teaching and a new role for the teacher in content presentation.

IV. CONCLUSIONS AND RECOMMENDATIONS

At this stage of development, maximum advantage cannot be taken of the dial access technology or the instructional materials and programs available to it. The rapid developments in electronic technology for the retrieval and transfer of stored audio, visual, and printed information and the possible instructional patterns for utilizing this technology, do not present the kind of stability that an institution can confidently expect for finding and adopting tried and true instrumentation and techniques. Nor at this point can cost effectiveness be fairly evaluated. The time has been too short for the most economical production of equipment or the assessment of learning results from research.

Strong arguments are put forth for direct rather than electronic access of presentation equipment and instructional media with the emphasis on much lower costs and student control or manipulation of the material. And perhaps in many cases this would be the logical "phase one" in planning for the more sophisticated and costly remote access system. In the final analysis, each institution will have to weigh the relative merits of both approaches in terms of their budget, educational objectives, amount of use, expansion plans, and other factors. The analogy of the Federal Communications Commission that once had to decide the national adoption of the mechanical CBS color wheel (accepted and reversed itself) or the much more costly RCA electronic color tube may serve as a case in point. The decision for an electronic system is not often an easy one.

However, there are definite trends in the relationship of information resources, storage, and distribution that are showing the way in which modern instructional systems should move. The new technology is directing its goals to providing students with a superior education by exploring and using the latest learning techniques and concepts.

There appears to be little doubt that the imaginative use of multi-media can stimulate and enhance the learning process as compared to the single medium of either the written or spoken word. This is not to conclude that the book or lecture has seen its day, but their effectiveness for transferring information can be increased with the integration of other media (to which Dr. Postlethwait's audio-tutorial method testifies most eloquently). The dial access system with its convenience and ready availability offers to speed the process of the multi-media approach to education.

Our study has shown an increasing interest and use of dial access systems, particularly, in the Northeastern states, in Illinois, and in California. In those high schools where flexible scheduling has been introduced, the free time for study has facilitated the acceptance and use of dial access technology.

Effective utilization of the system, depends on a number of factors--the most important of which are:

- Participation by the faculty and their active involvement in the planning and decision-making.
- Incentives for the faculty including release time and compensation for developing materials, competent technical assistance, quality facilities, off-the-shelf software, seminar workshops, etc.
- Convenient location of student receiving stations.
- Adequate lead-time in planning for the system.
- Service-oriented librarians, dedicated to assisting the user of the system whether instructor or student.
- Coordinated organization of the various media resources in one central facility.

In terms of learning effectiveness, general comments tend to support positive results when the system is used:

- To permit the teacher and student to evaluate performance and methods.
- To provide opportunity for the student to respond.

The response of students and faculty alike, as measured by the questionnaire, showed 90% positive attitudes for each group towards the use of dial access technology. Unfortunately, there is little research to determine how this favorable attitude affects learning or utilization of the system. It is therefore recommended that research be undertaken to determine the effects of dial access retrieval on:

- Student learning - grades and performance
- Study patterns
- Role of the teacher and use of time
- Curriculum
- Methods
- Role of the library
- Cost effectiveness

Other areas recommended for research and study include:

- The integrated use of dial access with other modern instructional technologies: ITV, radio, EVR, computers, electronic response systems, etc.
- The potential and effects on dial access systems of developments in compressed speech, single concept films, programmed media.

The Center for Educational Technology at Catholic University plans to continue its studies in this rapidly emerging technology in order that it may respond to the increasing demand for up-to-date information and may assist in the development of quality software through seminar workshops, institutional cooperation, publication of successful utilization, and information on sources of evaluated instructional materials.